Electrical Review

Vol. 78—No. 21. CHICAGO, SATURDAY, MAY 21, 1921. Page 803.

Electrical Salesmanship by Mail for Retail Dealers

Large Electric Appliance Manufacturer Successfully Launches Correspondence School for Clerks and Salesmen in Contractor-Dealer Stores—Course Furnished Without Cost or Restrictions

By JOHN B. MANNION
Edison Electric Appliance Co., Chicago.

"How did you hit upon the Edison School of Salesmanship," a prominent merchandising man asked Geo. A. Hughes, president of the Edison Electric Appliance Co. They were discussing the very successful venture of Mr. Hughes' company to educate salesmen and clerks of electrical dealers and jobbers.

"I believe we just anticipated a bit," said Mr. Hughes. "We've never really lost sight of the fact that the crucial problem of the electrical manufacturer is to help the dealer move merchandise from his shelves. We've always had this in mind and have done considerable missionary and sales educational work from time to time. We've kept before us, too, the idea that the most direct contact between an electrical manufacturer and an electrical dealer is the latter's salesman and clerk. He's the man who actually closes sales. He's the man who meets the consumer, too, and, consequently, the more he knows about selling and about electrical appliances and merchandising, the more appliances he will sell. He'll really speed up turn-over and that, after all, is what the manufacturer wants."

John B. Mannion.

Mr. Hughes tells how the Edison School of Salesmanship started in his masterful little prospectus entitled, "A Coat-Pocket College of Electricity." Commenting on the subject, Mr. Hughes outlined the origin of the school as follows: "I wanted to see what could be done in the matter of electric-appliance salesmanship. There is such a wonderful future for electric appliances that, surely, everyone selling them will want to know how he can readily master the subject and so ride ahead to greater success on the advancing wave of this rapidly growing business.

"We called in a group of experts and asked them to prepare a course in electric appliance salesmanship that a busy man could easily master—a college, so to speak, that he could carry around in his coat pocket—so that he could study the subject systematically at odd moments during his leisure time."

There resulted from the preliminaries mentioned by Mr. Hughes a very comprehensive, concise and compact correspondence course which is now being distributed to 10,000 ambitious and alert electrical salesmen and clerks. No discrimination has been exercised by the company in the acceptance of enrollments. The salesman handling a competitive line of appliances is being made to feel just as welcome as those salesmen and dealers who specialize in the products of this company. Many salesmen of these competitive organizations have grasped the opportunity too. All these salesmen and clerks are getting clear, practical, usable ideas about elementary electricity—static and current electricity, direct and alternating currents, kilowatt hours, meters, fuses, conduction, radiation, transformers and so on. These are the fundamentals of electricity and these are the things so necessary to a well-informed clerk or salesman. The beauty of the lessons on basic electricity is that they are absolutely free from the technicality and higher mathematics that commonly frighten the non-technical seeker after electrical knowledge.

Mr. Hughes strikes a responsive chord, therefore, when he says to the salesman in his pro-

spectus: "Instead of having to confess that you can't answer the questions put to you by your customer or prospect, you will be able as a result of mastering these lessons to show your efficiency by going right to the heart of most of the problems presented to you."

Outline of Subjects in Edison School Electrical Lessons.

The course has five lessons on electrical appliances. It gives practical and serviceable pointers on sockets, switch-plugs, fiber bars, electric flatirons, air heaters, heating pads, immersion heaters, toasters, hollow-ware, grills, percolators, chafing dishes, vacuum cleaners, sewing machines, ovens, stoves, ranges; also the care of these appliances, the principles of their construction, their special merits, the proper service to use in connection with them, what to avoid, and how to look for trouble and to overcome it. Here are a few items the student in the Edison School of Salesmanship learns in the lessons on electric appliances:

1. Five big reasons in favor of using laundry irons.
2. How to figure the amount of electrical energy required to warm a certain-sized room.
3. The advantages of percolated coffee.
4. The two types of heaters used in percolators and chafing dishes, and which is superior.
5. The two types of sewing machines—rotary and vibrating shuttle. The merits of each.
6. Ways in which electric ovens differ from other kinds.
7. Advantages of electric cookery.
8. The two types of electric stoves—disc and open-coil.
9. Care of electric appliances.
10. Connecting to proper voltage.
11. Disconnecting appliances.
12. Detecting trouble.

Department of Salesmanship and Store Management.

There are also five lessons in merchandising, store management and salesmanship. In this section of the course the student is taught that volume of retail business depends primarily upon aggressive salesmanship. Good, sound, incisive talks are given on the composite of qualities a real salesman should have—honesty, knowledge of goods, personality, fairness, application, enthusiasm, loyalty and ingenuity.

The relation of the retail dealer (also central-station merchandising departments) to jobbers and manufacturers is explained. Their responsibilities to one another are advanced and discussed. It is made clear that the retail store can most effectively co-operate with the manufacturer by maintaining an efficient sales personnel. The responsibility of creating demand for goods rests with the manufacturer; he accepts this responsibility by national advertising, sales promotive helps and educational campaigns for salesmen; he supplies posters, store displays, car signs, folders, etc. The dealer fulfills his end of the bargain by employing an alert sales staff and educating them to use these helps effectively, to recognize the advertising importance of window space and to master the principles of salesmanship.

In the store-management sections of the course, novelty and action in window display are emphasized. Practical demonstrations are pointed out as being especially instructive and interesting, and ventilation, light, fixtures, and service are given expert consideration.

In all lessons merchandising and salesmanship are nicely interwoven. For instance, it is suggested that the retail salesman purchase goods as well as sell them; that the purchasing man be guided not so much by profit on single articles, but rather by the rapidity of turn-over; that the purchaser should take cognizance of the co-operative and promotional helps furnished by the manufacturer, and that he should consider well the guarantee and responsibility of the manufacturer. Then it is suggested that stock should be placed on a definite maximum and minimum limit basis governed, for example, by seasonal conditions; viz, the stock of air heaters should be low in summer and full in winter.

Fundamental stuff, it might be thought, but definitely serviceable to the retail salesman and clerk and the new dealer who hasn't had the opportunity to school himself in these elementary merchandising principles. The Edison School of Salesmanship teaches him what he may later learn through adverse experience, and, in this way, anticipates the contingency. Ten thousand enrolled students in 3 mo. amply testifies to the success of the Edison School of Salesmanship and its methods of administration. A file well filled with appreciative notes also speaks eloquently of the enthusiastic reception the Edison School has secured.

Enthusiastic Praise for Edison School From Many Sources.

Following are some of the comments of men in the electrical field:

The sales manager of a large Ohio electrical jobbing and manufacturing house said: "We think you can do a tremendous amount of good with this course and we shall be glad to assist you in any way possible towards achieving good results. We have entered nearly all of our own organization in the Edison course and we shall see that they really study it."

Enthusiasm of the director of publicity of a big Wisconsin jobber found expression in these words: "We can readily see where the Edison course is going to be of untold interest to thousands of young men and others interested in the electrical industry, which, in turn is bound to benefit the manufacturer, jobber and electrical dealer by creating a heavier demand for electrical appliances."

The advertising manager of a national cement organization said: "From an advertising viewpoint, we compliment you upon this constructive work, for we feel that you have sounded a new note in educational publicity which is bound to be of benefit to yourselves as well as your dealers."

The dealer, his clerks and salesmen are really the judges, however. "This is just what I've been looking for. It is a very fine Christmas present," wrote a salesman from Janesville, Wis.

"The Edison School is rendering an excellent service. I hope that all who enroll may appreciate it," said a salesman of the Michigan Light Co., at Bay City, Mich.

A dealer of Rochester, N. Y., writes: "Your lessons are easily understood and bound to be a big help to us all."

The methods employed in conducting the

school are as follows: (1) Each paper is graded and carefully reviewed; (2) model answers—flexible and apt—are sent with each problem sheet received; (3) a special advisory service is conducted in conjunction with the engineering department; (4) a follow-up of inspirational letters designed to stimulate interest and increase returns. (This has been pronounced by an officer of an extension University as "about the finest I have seen along that line.") (5) Friendly, intimate letters, for which the school offers an unusual and justifiable opportunity, are sent.

Only a man of unusual vision and courage would foster the Edison School of Salesmanship and offer it to the entire industry "for the use of all those engaged in selling all kinds of electrical appliances." It takes the fabric in a man that is native, and instinctive and characteristic of those leaders who are benefitting the electrical industry so notably through their broad views of co-operation and reciprocity.

The following words of faith, confidence and cheerfulness in the future of the electrical appliance business addressed to appliance dealers and salesmen, are from Geo. A. Hughes, who conceived and sponsored the Edison School of Salesmanship in these trying times, and who is responsible for its success:

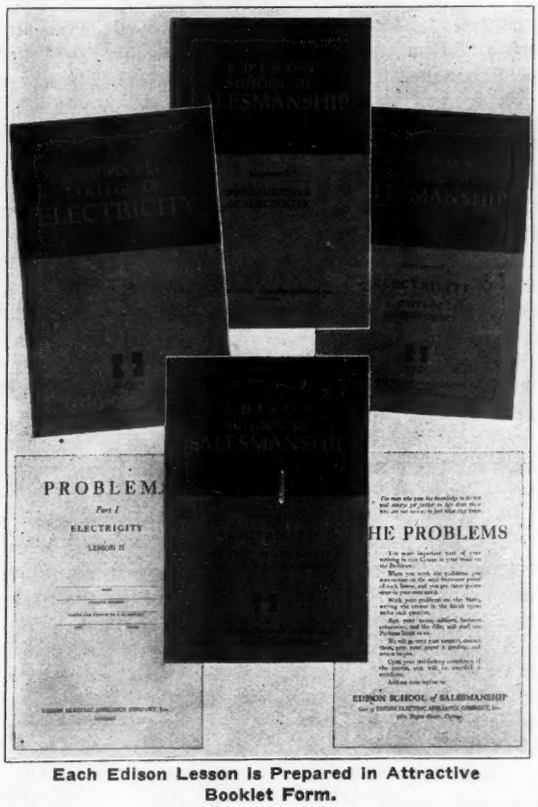
I take it that you're a happier man if you realize that you are in a line of business that is decidedly beneficial to the folks you sell to. I know that I am. There's something mighty clean and wholesome and comfortable about the whole electrical appliance field; and this is especially the case in its effect on women.

Household work was drudgery until electrical appliances came, and in many thousands of non-electrical homes it is drudgery still. This fact is shown by the way servants act. They are quick to leave the home and go into the factory, the store or the office. But our wives can't leave. They have to shoulder the whole home management with a hundred things to be looked after constantly.

Electricity, however, has come to the home as a servant who is always on the job. It saves the housewife thousands of steps and much back-breaking work; it frees the home of much dust and grime; it does away with the need of much watching and staying "cooped-up" at home. Electric ranges may be depended on to roast the meat properly while the lady of the house goes shopping. The electric flatiron cuts down much of the drudgery of ironing. The electrically-equipped home allows decidedly more leisure for the better things of life.

The world is moving surely into an era of greater electrification. Extensive as is the use of electric appliances today, we as yet have only scratched the surface. The future possibilities are tremendous.

Master the selling of electrical appliances, and you more firmly identify yourself with an industry already very extensive and destined to have a still mightier growth in the future."



Each Edison Lesson is Prepared in Attractive Booklet Form.

And finally, in the prospectus, "A Coat-Pocket College of Electricity," Mr. Hughes says: "We ask no tuition for this course. We supply the lessons and the service of experts to grade your papers free of cost to you. As the largest manufacturers of electric heating appliances in the world, we are vitally interested in the advancement of the whole industry. It, therefore, is our object in furnishing these lessons to spread technical knowledge which will assist many identified with this industry, and thus contribute to its progress."

"Service" is a term widely used in the business world nowadays. It means a benefit—an improvement—a good turn—a source of goodness, utility and happiness. Applied particularly to a business house, service indicates that the house gives a margin of benefit to the customer in such a manner as to promote confidence in the goods purchased and a determination to trade as much as possible with that house. Such is the service taught by the Edison School of Salesmanship.

Men of the last generation, still lingering with us in the last half century of their lives, did not in their early days have access to half the knowledge of electricity, salesmanship, store management and advertising available today. This fact should be an inspiration to the present generation in the ranks of the electrical industry today. It should be an inspiration to contractor-dealers and their clerks and salesmen that, with such knowledge as they may gain from this course of study in the Edison School, they will be more completely equipped in their chosen profession than those men were in the days of their early struggles. This knowledge should be used. It should be put to work, for in the measure that practical application is made of the fundamentals of this Edison Course will they surely and steadily forge ahead on the road to success with the fullest assurance in their equipment to achieve the highest aim of the alert business man.

TO ELECTRIFY CENTRAL AMERICAN SUGAR MILL.

It has been decided to electrify the new sugar mill of the Sula Sugar Co. at La Lima, Honduras, and plans have been drafted which will make it the largest electrified sugar mill in Central America. Power will be developed by a 1000-kw. turbogenerator set with an auxiliary set of 200 kw. for lighting and general purposes. All the electrical equipment will be furnished by an American company and installation will be made

by the same American company that is constructing the mill. The fuel to be used for running this system will be cane fodder and scraps, the supply of which is expected to be sufficient. Construction of the new mill is going forward rapidly. The boilers have been set in place and smokestacks and water towers erected. Most of the heavier machinery is also installed and the machine shop is nearly completed. The first cane will be crushed in October.

ELECTRICITY IN ITS APPLICATION TO THE PROCESS ARTS.

Three Temperature Zones Employed in Electrically Smelting and Fusing Ferrous and Nonferrous Metals and Artificial Products.

By CHARLES A. WINDER,
Industrial Heating Department, General Electric Co.

Electrical energy enters into every phase of the process arts. It received its first impetus some 20 yrs. ago through the achievements, at Niagara Falls, of Dr. Acheson in his experiments in the manufacture of carborundum in the high-temperature electric furnace. Since that time it has rapidly spread throughout every phase of industry until it promises to replace at no distant date a large percentage of all the other forms of heat. This growth is due to the fact that heat produced from electrical energy is pure heat, uncontaminated by any products of combustion, such as are always present where the source of heat is from any other fuel.

Electrical heat might be classified into three zones: first, the high temperature zone, that above 3000 deg. C.; the medium-temperature zone, from 1000 to 3000 deg. C., and the low-temperature zone, below 1000 deg. C. In the highest zone are found such processes as the manufacture of ferro alloys, artificial abrasives, artificial graphite, artificial refractories, steel furnaces, etc. In this range of temperatures electrical energy finds the least competition, it being the only method by which can be obtained temperatures required for some of the smelting processes carried on in the arc furnace.

Competition of other forms of fuel from the standpoint of fuel costs increases as the temperature goes down. In the medium temperature range are found such processes as the melting of nonferrous alloys, copper, zinc, lead, tin, glass, aluminum glass, etc. In the lower range the heat treatment of carbon steels equipment for baking cores, enamels, japans and various other drying processes.

While the competition seems keenest in the lower range, yet in the last few years it is in these lower temperature equipments that the gradual increase has occurred in the use of electrical energy. The impetus was given due to the fact that, as a source of heat, electrical energy is easily controlled, clean, safe and can be made thoroughly automatic. The increased seriousness of the labor situation makes the above factors of increasing importance in any of the process arts and it is now a recognized fact that the cost of fuel can be almost disregarded in view of the large labor saving made possible by the automatic facts that can be included in any electrical heating equipment, together with a reduction in waste by contamination from byproducts of combustion.

Recently considerable attention has been paid to proper heat treatment of steels. This has been a subject which has had little scientific consideration until very recently when the demands upon material have been such as to require greatly improved characteristics.

It is now becoming an acknowledged fact that heat treatment is not only a process of absorbing heat and properly quenching, but in properly applying heat as well; and here is where the average talent in heat treatment fails to appreciate the importance of heat application. By way of illustration it will be recalled that the sun is closer to the earth in winter when temperatures are very low, and farther away from the earth in summer when temperatures are high, with reference to the temperate zone. The difference in the application of the heat, and where radiation is used as a means of transferring heat, a great deal more must be known of the action of the heat waves before the ultimate success can be obtained in heat applications.

With the advent of electrical heat, radiation will play an important part in the future and there may also be considerable heating done by conduction as well as induction. One is, therefore, in the position today of the electrical engineer whose knowledge of electricity is confined to Ohm's law, and one must know as much about the "ifs" and "ands" of the application of heat to win success as the electrical engineer today must know about the "ifs" and "ands" of Ohm's law.

To illustrate how rapidly electrical heat is coming into its own, it might be well to call attention to the enormous increase in the use of the electric furnaces for the making and melting of steel and iron as well as ferro alloys; also the rapidly increasing demand for electric furnaces for nonferrous metals and alloys in the medium range of temperature.

When one stops to realize that in the automotive industry perhaps 90% of the cars produced today have enamel or japan baked on the fenders and bodies electrically, it may be seen how rapid has been the advance in the lower temperature range. The war brought on an increased demand for more accurate and better heat treatment of shell forgings and gun forgings, and many electrical heat-treating furnaces have been produced and are in successful operation. Furnaces varying from 3 ft. diam. by 5 ft. high, to 10 ft. diam. by 105 ft. high have been built for this purpose, these requiring from 10 to 4000 kv-a. each.

There are many industries where the advent of electrical energy for heating purposes seems to be very propitious. One of these is vulcanization of rubber, which is a tremendous industry requiring many hundreds of thousands of pounds of steam and a great deal of labor to handle the vulcanizing process.

The opening of a new office of the Bureau of Foreign and Domestic Commerce in the Chinese-American Bank of Commerce building, Shanghai, China, provides American foreign traders with another source of information and supplies an additional medium through which Chinese buyers can be reached.

Schools a Potential Market for Electrical Contractor

Attention Is Called to Enormous Shortage of Facilities and to Inadequate Lighting Equipment Found in the Older School Buildings—Suggestions Worthy of Thoughtful Consideration*

By FRANK BRUCE
Publisher, American School Board Journal.

The shortage of permanent school facilities has grown tremendously during the last few years, and at the present writing is not being decreased materially—first, because of the steady increase in demand, and second, because building programs are just getting under way. Temporary arrangements have been made by using portable buildings. The manufacturers have sold and are selling large quantities of them, but these provide only temporary and rather inadequate facilities which do not affect the need of permanent buildings. The estimated shortage runs from 3,000,000 to 5,000,000 school sittings which, of course, means facilities to properly house and care for a like number of school children.

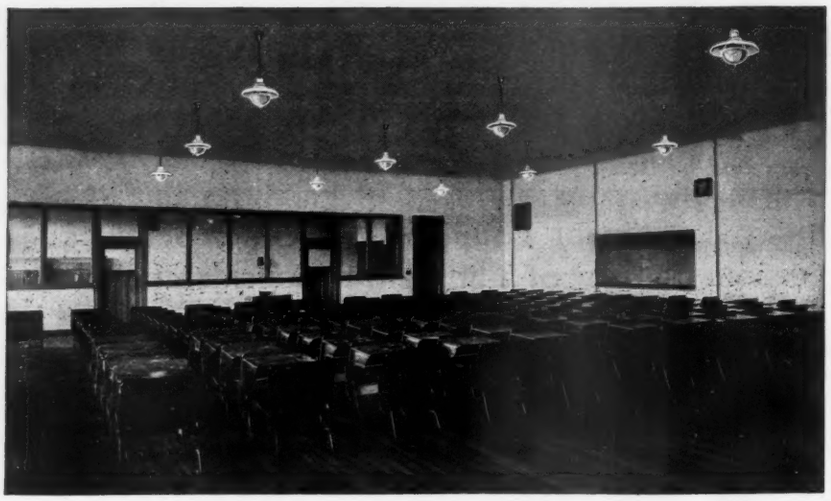
In the past schools were very poorly lighted because they were used only in the daytime, and because of the common belief that artificial lighting was not necessary. A comprehensive study and some scientific research have proven the advisability of artificial lighting in school rooms, and lighting engineers have developed standard plans for lighting school rooms. With the development of such fixtures as the "Denzar" it has become possible to provide artificial light of proper quality on dark days and at other times when ample light is essential.

*Text and illustrations, courtesy of Beardslee Chandelier Manufacturing Co., Chicago.

Requisites of Proper Illumination for Class and Study Rooms.

Moreover, during the last 2 or 3 yrs., the schools have developed into social and recreational, as well as political centers, and in many cases night courses are now being offered for older students whose education was not completed in youth. Hence, greater use has been made of the school building and, since the additional activities must take place after regular school hours, adequate lighting of the school building has become imperative. The great work of Americanization is now being carried on in many of our school buildings and the only available time for it is at night.

Auditorium in Galion (O.) High School Illuminated With "Denzars" in Various Types of Installation.



"Denzars" Installed by Staley & Co. in Eldorado (Kans.) Junior High School.

Lighting equipment of the classrooms and school buildings must produce uniform illumination of sufficient intensity to permit accurate work, but without glare or harsh shadows which cause eyestrain and fatigue. In many classrooms the old school desk is becoming a thing of the past and in its place we have a modern movable chair desk. It has become popular because it permits the use of the school room for all kinds of special or general night work. Hence, such school rooms must be so well lighted that the occupants are not conscious of the light sources.

There are three reasons why the electrical contractor should endeavor to secure the school business of his community: First, the schools house about one-quarter of the population for a definite period of time every day and the lighting equipment for them will undoubtedly be the largest single installation which the average electrical contractor can secure. A school building housing from 200 to 300 students makes a sizable fixture order and one which the electrical contractor is apt to overlook in his quest for small orders.

Second, the increased use of the school building for recreational, social and political activities and night study work brings a good portion of the population to the school building some time during the year. Many people will observe the lighting equipment and, providing it is good and the light ample, the influence of such an installation creates the demand for good lighting elsewhere. Further, the electrical contractor who makes the installation can mention it to advantage when soliciting other kinds of business.

Third, until production in factories has exceeded the demand and the cost of construction has been reduced to a point where factory and business buildings can be erected at a profit to all concerned there will not be a great demand for lighting units for them. However, we must provide school facilities for the children of the nation, bonds will be voted and schools erected; consequently, for the next 5 yrs. the electrical contractor should look to the school house as his most profitable market.

In the larger cities the boards are working on so-called building programs of a most comprehensive character. In cities like Buffalo, Detroit, Chicago, Minneapolis, Denver, San Francisco, Cleveland, etc., the school building programs are laid out for 5 to 20 yrs. to come and the electrical contractor who gets in on the ground floor early will reap a substantial reward.

Valuable Time Lost in Schools for Lack of Artificial Light.

H. A. Harris, Pittsburgh representative of the Beardslee Chandelier Manufacturing Co., in a current issue of *Beardslee Talks,* says:

"The most difficult problem one encounters in lighting a school house is to get the school board to see the necessity of lighting the classrooms. The average director is of the opinion that the building is so located and planned to provide sufficient daylight and, hence, artificial lighting is not necessary, but a useless extravagance. He does not realize that a good many school hours each year are lost because artificial lighting has not been provided for cloudy, dark days.

"Thousands of dollars are spent by the directors for buildings and equipment; an adequate force of principals, teachers, janitors and other help is provided to operate, clean and heat the buildings; then comes a cloudy, dark day and the entire machinery of the school stops because artificial lighting has not been provided. Hence, all the cost of running the school, including interest on investment, salaries, fuel, etc., is thrown away.

"The work of each school is laid out for the year and a program arranged for so many school days of so many hours each, and no provision is made for loss of time because of dark weather, yet a fair percentage of time is lost in each school year because the lighting is deficient. One has only to ask any principal or school teacher to verify this statement.

"Lighting of the school building may be divided into two parts, viz., the lighting of the classrooms and gymnasium, and the lighting of the balance of the building. If there is an auditorium, imposing entrance and main corridor, the decorative features of these may require chandeliers designed to harmonize. The halls, toilets, locker rooms and similar parts of the building are usually not difficult to handle.

"It is the classrooms and gymnasiums which require the most and best thought, as in the former the actual work of the school is conducted, and in the latter, good lighting is essential for athletic sports. Of course, there is a wide diversity of opinion as to what is the best unit for use in the classroom, but there are certain rules which

should govern the selection of fixtures. First, the number and size of the fixtures and the wattage of the lamps should be ample to provide sufficient illumination in all parts of the room and the fixture selected should give even distribution over the area it lights.

"Second, there should be no glare in the eyes of either students or teacher. There should be no exposed lamps that cause eyestrain and the light source should be out of the line of vision, not less than 9 ft. from the floor. Third, the lighting unit should be simple, easy to operate and easy to keep clean. It should not be a dust-catcher and should not be of such a nature as to be readily affected by an accumulation of dust.

"Right now is the time to take up school lighting in order to have it installed during the summer vacation and in readiness for the beginning of the next school year.

"Go to the school buildings in your town; find out if they are properly lighted and, if necessary, make a chart showing the foot candles on every desk. There should be at least four units in each classroom, although six are usually better for an even distribution. Make a plan of what should be done to improve the lighting in your school buildings.

"Don't blame the board or the school authorities for the bad conditions that exist; the trouble is, the lighting question has never been put up to them properly. It is the place of the fixture dealer or electrical contractor to find out what the conditions are and then show the school board what should be done and the reasons why."

Contractor Should Work With Architect on School Buildings.

Some additional hints of a helpful nature are contained in the same issue of *Beardslee Talks* by W. P. Firth, who says:

Both grade and high schools are public or semi-public buildings, and hence are controlled by state, city or county officials and the school laws governing these bodies. The planning, designing and building of a modern school is a highly specialized business which cannot be placed in the hands of men who are not familiar with modern practices. Not many years ago our school buildings consisted of four walls, enclosing two or three floors which were cut up into classrooms and halls. Today there is a distinctive style of school architecture and school buildings are planned to provide the greatest mental and physical development possible for the student. The casual observer little appreciates the amount of study and development that have been done in the interest of the grade and high-school pupils. Such things as ventilation, artificial and natural lighting, seating arrangements, auditoriums, gymnasiums, locker rooms, lunchrooms, intercommunicating telephones, program clocks and a host of others which were not dreamed of 10 or 15 yrs. ago are now provided in our modern school buildings. Hence, the board of education which is planning a new school building usually engages the services of a capable architect who is familiar with all the details of modern school-building construction, and with him works out every detail before the plans are finally accepted.

According to law the general contract is then advertised for the taking of bids and awarding the contract. At this time the electrical contractor should submit his bid for the electrical work either direct, or, as is more generally done, as a subcontractor to the general contractor. If the electrical contractor is successful in securing the wiring contract he is usually ambitious to secure the contract for the lighting fixtures as well, but if he fails to secure the wiring contract he frequently neglects to put in a bid on the fixtures when this letting is advertised. In this particular he makes a mistake.

There was a time when school lighting jobs were not much sought after by electrical contractors, for when installations were made they consisted principally of drop cords or cheap pendants with poorly designed reflecting shades. Even the wiring amounted to very little and the so-called fixtures amounted to still less, but today the wiring of a school building follows modern methods and, hence, requires the use of panelboards, switching arrangements and considerably more work than was formerly done. Hand in hand with improvement in the wiring has come a demand for more and better fixtures. Generally, their wattage is far greater than that of the old

View of Hall and Corridor in Galion (O.) High School Lighted With "Denzars."

pendants and drop cords, hence the fixture contract has become a real order—one which necessitates the use of a large number of chandeliers and other lighting units, and which demands that the equipment furnished shall be of the highest quality.

With most all school work the architect is the final authority and the electrical contractor who wishes to secure the lighting-fixture contract must look to him for approval of the equipment he proposes to furnish. Most architects are overfed with suggestions, while but few of them have been furnished facts and practical demonstrations which will assist them and their associates in the detail work of lighting, which on completion must pass their rigid censorship. Hence, the electrical contractor should co-operate with the architect to produce the best lighting results. If he is familiar with and can explain the detail merits of the lighting units he suggests, he should endeavor to secure the confidence of the architect and by demonstration prove conclusively that his lighting unit merits selection.

NOVEL ATTRACTION FOR WINDOW DISPLAY.

Recently a great many people were observed in front of the electrical store of the Standard Washing Machine Co., 6149 South Halsted street, Chicago. The attraction proved to be a large toy balloon which was resting stationary midway between the top and bottom of the window. From the balloon was suspended a tiny celluloid doll. About the body of the doll was a bit of cloth secured by a safety pin to which the supporting string was attached.

The balloon made no movement whatever and this puzzled many of the observers until they went inside the store to satisfy their curiosity. Mrs. B. Welty, manager of the store, kindly explained that the balloon and its tiny burden was maintained in its place by a current of air which was being continually exhausted from an attachment to a vacuum cleaner intended for use in blasting dirt from behind radiators and close niches and corners. The weight of the safety pin prevented the balloon from rising, while the current of air kept it from falling. The doll and pin acted as a stabilizer. The attraction was evolved by Mrs. Welty.

A CORRECTION.

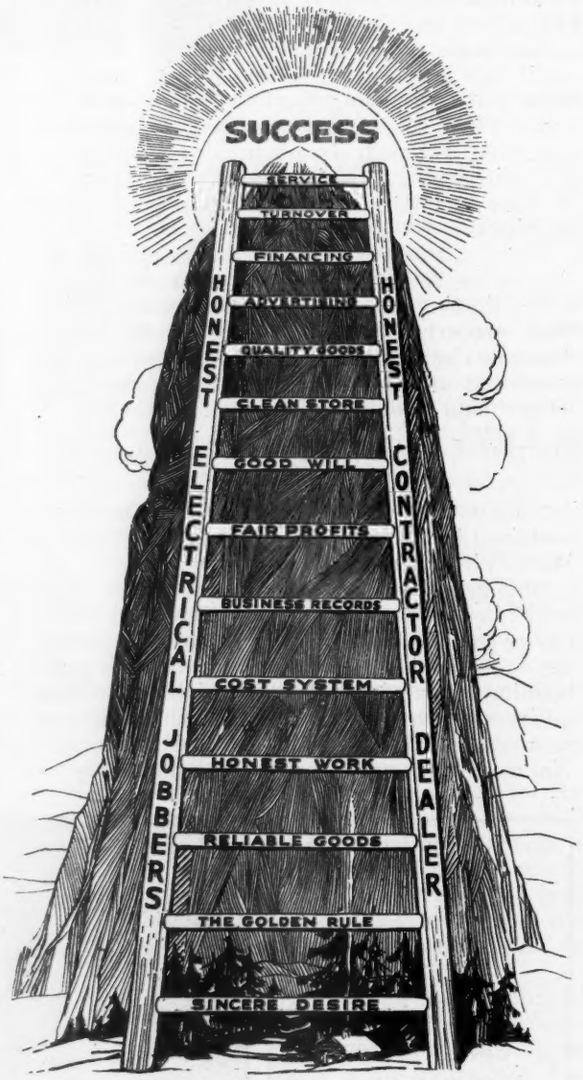
On the first page of the first article in the April 23 issue of ELECTRICAL REVIEW, written by Miss Katheryn Maddock, there appeared an illustration of a large apartment building in which each kitchen is equipped with an electric cooking range. The caption beneath the illustration stated that the approximate cost of the installation of ranges was $7000. The figures should have been $27,000. The ranges were made by the Standard Electric Stove Co., Toledo, O.

A bill has been presented to the State Legislature of Pennsylvania by Representative Green, Philadelphia, forbidding public utilities of all kinds from disconnecting or discontinuing service until 10 days' notice in writing shall have elapsed. A fine of $25 is provided for failure to observe the provisions.

ELECTRICAL JOBBER BUILDS LADDER TO SUCCESS.

Fourteen Rounds Are Imposed in Business Ladder Erected for Co-operative Advancement of Honest Wholesaler and Retailer.

At the recent merchandising and sales convention given by the Newark Electrical Supply Co. to the electrical contractor-dealers of New Jersey, O. Frederick Rest, general manager, stated that in his opinion the first rung of the ladder to success for the honest electrical jobber and the honest contractor-dealer was sincere desire, followed by the practice of the Golden Rule, merchandising reliable goods, giving honest work, instituting a cost system, keeping proper business records and



taking only a fair profit. Then the next steps would naturally be the developing of good-will, maintaining a clean store, handling quality goods, regular advertising, sound financing, reasonable turnover and finally service.

The accompanying illustration graphically presents the above 14 requirements and suggests that if honest electrical jobbers and honest contractor-dealers would co-operate along these lines, they could undoubtedly climb the ladder of success together.

Value of Jobber's Personality in Appliance Advertising

Discussion of Advantages to Wholesaler in the Display of His Name in Connection with Various Combinations of Product, Manufacturer and Retail Dealer—Waste of Effort Condemned

By FRANK B. RAE, Jr.

Shall the jobber, in his advertising, be himself, or someone else? Shall he, that is to say, advertise his own identity, and build up appreciation of his services in the minds of the public, or shall he merge his personality with that of the manufacturer and change his character and complexion every month? Shall he merely represent someone's ranges in April, someone's else electric sewing machine in May, an electric fan manufacturer in June, and so on through a chameleon sort of existence from year to year?

The progressive jobber must choose, it seems, between being a series of rubber stamps for other people, and cultivating a name for himself and confidence in his firm as a reputable, dependable business house. George S. Milner, manager of the Erner Electric Co., Cleveland, is an advocate of the latter policy which has produced highly successful results for this concern.

The Erner Co. formerly used the "Dealer's Name Here" type of advertisements as supplied by manufacturers, and written by a copy hack in an advertising agency. The change in advertising method was made because of a conviction that the jobber would be a better agent for the manufacturer's purposes as well as for his own if he would advertise himself.

One Successful Jobber Eliminates All Firm Names From Advertisements.

An extreme case of the opposite viewpoint is that of a successful California jobber, Listenwalter & Gough, Los Angeles. This firm is carrying on an electric cleaner campaign in which the advertising bears no firm name at all. The trade name of the cleaner is all that identifies the displays. Even the name and address of the manufacturer are omitted. Listenwalter & Gough blaze the merits of the national product broadcast when and where they believe it will be of most value to their dealers without any reference to its own firm publicity whatsoever.

"We are of the opinion," said P. G. Gough concerning this policy, "that a jobber fortunate enough to obtain a desirable line can well afford to advertise it consistently. In our cleaner advertising we have set aside a yearly budget of approximately $1 per machine, to be spent in newspaper advertising. These advertisements appear without either our name or the manufacturer's name under them. They are purely advertisements for the cleaner. What we must accomplish is to put the name of the cleaner before the public so that when thinking of cleaner they will inevitably think 'Royal,' and inasmuch as we have no desire to put our own name before the public it would be only a waste of space to do so.

"The results which we have accomplished through this system are very gratifying. Electrical dealers are enthusiastic over articles advertised in this manner in their local papers. This kind of work has a tendency to make the electrical dealers 'stay put,' and we have found that it is very difficult for competition to make any headway against us."

Mr. Gough is a thorough believer in the necessity for the jobber's unremitting efforts to build up the local market, even though he does not recognize the advisability of publicity for his own name.

"If the electrical jobber is to be a factor in the large appliance business of tomorrow," he declares, "he must realize that his work is not merely to take orders for these appliances, but to create the demand by local advertising, to help his dealers build sales organizations and, above all, to maintain a service that will create goodwill for all of his customers."

The position Mr. Gough takes regarding public

ROYAL
ELECTRIC CLEANER
Royal Cleans Hard Places Easily
The Royal's wide nozzle lies close to the floor—extends on either side of the cleaner and reaches with ease under low furniture, radiators, and into corners and narrow places which so frequently defy the ordinary cleaner.
Cleaning hard places easily is just one of the many reasons why we selected the Royal Electric cleaner as fitting Erner standards of service. Our careful and exhaustive investigations of electric cleaners convinced us that the Royal is the most versatile, most thorough electric cleaner for sale today.
The Royal is worthy of your confidence because it is worthy of Erner endorsement. We recommend it without reservation and guarantee that you will make no mistake in buying one. Royals are demonstrated and sold by dependable dealers.
ERNER
ELECTRIC COMPANY
WHOLESALE — CLEVELAND

Advertisement in Which Jobber and Product Are Mentioned.

Your Prettiest Things Come From the Crystal Beautifully Laundered
(Dealer's Name and Address)
Crystal
Electric Washer & Wringer

Display Advertisement Provided With Blank Space for Dealers' Names.

recognition of the jobber certainly represents an extreme of modesty. A middle ground is that of the distributor who adopts the manufacturer's advertising ideas and publishes these over his own signature. He is represented by a dozen different series of advertisements during the year, all different in style, treatment and policy, practically obliterating the jobber's individuality, so the Erner Co. maintains, weakening him in his community and with his trade, and carrying no cumulative value. It will be seen that Mr. Gough, in eliminating the jobber's name, dodges these disadvantages, but at the same time obtains no general prestige for his firm.

"Since the dealer must carry other lines than just one manufacturer's," says Mr. Milner, "it seems that the manufacturer must recognize that the stronger the jobber is in his local relations with the trade, with the building, contracting, industrial and banking interests of his own community, the better he will serve as a distributor.

"If the jobber follows the plan we have developed in Cleveland and publishes advertisements such as we are inserting his advertising will be quite as beneficial to Westinghouse, Royal and other manufacturers as their own ready-made stock offerings, and at the same time it will maintain his individual prestige, build up cumulative value and give him corresponding sales results."

Waste of Advertising Effort to be Avoided by Jobber.

It has been suggested by manufacturers that the jobber should insert his own individual advertisements in the newspapers alongside those of the manufacturer and that the wholesaler's display may then carry such prestige appeal as he may desire.

"We feel that such a program is wasteful," said Mr. Milner. "The manufacturer should join hands with the jobber on all local effort. We contend that the Erner Co.'s advertisements carry quite as much Westinghouse value, for example, as the individual Westinghouse advertisements. We contend further that in this case we have accomplished the difficult and desirable tie-in between the manufacturer's national advertising and the local distributing center. We believe that one advertisement of this type is just as strong as two separate advertisements, one by the manufacturer and one by the jobber."

The constructive work which the Erner advertising does is shown by the following extracts from advertisements in the Cleveland newspapers and publications of the building industry:

"The Erner Electric Co. sells wholesale only, yet those who buy at retail have a definite interest in the electrical goods we market. Being the foremost wholesale distributors in this territory, the best manufacturers seek to place their goods in our hands. We are in a position to pick and choose the lines we carry. Naturally, we choose the best. So, when the retailer or contractor offers any of the Erner lines listed below you may buy them with the utmost confidence. They are lines which we have chosen with scrupulous care after thorough investigation and with full knowledge of every similar article on the market."

Another is headed, "Make Erner Your Purchasing Agent." The advertisement emphasizes the fact that in purchasing an Erner article, the customer has not only the guarantee of the dealer's name and the manufacturer's reputation, but

THE ROYAL
and Its Qualities
Vacuum cleaners are numerous, but only one is Royal—and one only combines the famous and remarkable qualities of Royal-ty.
The Royal will maintain that luster on your polished floors as will no other vacuum cleaner, and it will not mar or scratch them.
With the Royal and its quick and easily interchangeable set of attachments, it is a complete house cleaning appliance and will keep your rugs spotless—your plate rails and picture molding dustless—your overstuffed furnitutre clean and fresh and the coloring the same as a new article.
Get a Royal for your home and live—and breathe pure, fresh healthy air.
ROYAL
QUALITY SERVICE
ELECTRIC CLEANER
Cleans by Air Alone!

Jobber's Advertisement Without the Jobber's Name.

also that of the Erner Electric Co. Three concerns are backing each sale with their good name —and not the least of them is the jobber.

One Manufacturer Who Advocates Jobber and Dealer Personality.

This policy of building up the jobber's reputation has an advocate in the manufacturer's camp in James L. Mahon, advertising manager of The P. A. Geier Co.

"When you spend your own money for adver-

JUST THE GIFT FOR A GIRL
An electric coffee urn, with its accompanying tray and accessories, is the ideal gift for the college girl. It has that air of smartness which is so much sought, yet is a practical sort of gift also, a gift that will give pleasure and be useful for many years to come.
In selecting this, or any electrical appliance, be sure to choose one of well-known make and buy it at a store which specializes in such wares. We particularly recommend
Westinghouse
appliances because we know absolutely that they are dependable. In design and finish Westinghouse wares are beautiful, but mere external beauty is not a safe guide in this class of merchandise. The hidden, inner quality of an electric appliance is of greatest importance, and it is here that Westinghouse excels.
The leading electrical merchants of Northern Ohio handle WESTINGHOUSE ware, and this year are fortunate in having ample holiday assortments. We suggest, however, that you make your selection at once, for the popularity of electrical gifts exceeds all expectations and merchants' stocks are rapidly being depleted. Look for a dealer who exhibits the Westinghouse mark
ERNER
ELECTRIC COMPANY
WHOLESALE — CLEVELAND

Type of Advertisement Representing Manufacturer, Jobber and Dealer.

tisements in your own home newspaper, be sure that they are really your advertisements," he says to his trade. "Do not sacrifice your individuality in favor of any product or appliance. Do not let your local public think of you as merely some big manufacturer's 'agent.'"

The P. A. Geier Co. urges dealers as well as jobbers to give their advertisements individuality.

"This advice, we realize, is contrary to the desires of certain manufacturers who are constantly offering cuts and ready-made advertisements with a blank space at the bottom for your name. We agree that the advertisements so offered are good, and that they help bring in business. But, after all, they are the other fellow's advertisements. They do very little to build up the jobber's or dealer's individual prestige. We believe that every jobber and dealer should advertise primarily to enhance the reputation of his own firm and his own service."

When the sign posts point in such varying directions as this, opportunities for differences of opinion are many. Does the Listenwalter & Gough policy of sinking the jobber's identity entirely, and concentrating upon the name of the national product, bring in sufficient sales to the dealers to justify the sacrifice which the distributor makes? Or, likewise, how much value is there in the simple and easy method of accepting the different manufacturers' advertising styles over his name? When compared with these two schemes in which the jobber plays a passive part, the aggressive advertising for individual prestige appeals to many as a very attractive play.

It is for Mr. Jobber to choose. This is his party. It is an important opportunity for the exercise of good judgment.

COLTON HOME ELECTRICAL SHOW IN DES MOINES.

Manufacturers Co-operate With Local Company in Large Appliance Exposition Which Proves Stimulation to Electrical Trade.

On the following page will be found a full page of illustrations depicting various exhibits at the recent electrical exposition held in Des Moines, Ia. The show, known as the Colton Home Utilities Exposition, was arranged by the Colton Co., an appliance and lighting-fixture house in Des Moines. It was made possible through the co-operation of 15 manufacturers who made special displays and provided factory experts to demonstrate the various lines.

Thousands of people visited the exposition. Among the interested visitors were classes of pupils from Drake and Des Moines universities and the three city high schools. Members of 150 women's clubs attended as special guests of the Colton Co. The show was said to be the largest undertaking of its kind in the state. It was reported as especially timely since it exercised considerable influence in starting the spring sales, not only in the city of Des Moines itself, but in nearby towns as well.

In the group of executives shown in the upper view of the middle column of illustrations on the following page are some of those responsible for the success of the show. Those in the lower row, left to right, are Weston Hill, Ronald Press Co., New York City; W. R. Hill, general manager, Isko Co., Chicago; F. F. O'Keene, Hardy Fixture Co., Lincoln, Neb.; D. C. Delancey, president, Crown Electrical Manufacturing Co., St. Charles, Ill.; W. R. Sweatt, secretary, Minneapolis Heat Regulator Co., Minneapolis; Robert Frankston, western sales manager, Pneuvac Co., Worcester, Mass.; I. L. Hallowell, general manager, Colton Co., Des Moines, Ia. Upper row, left to right—W. L. Colton, president, Colton Co., Des Moines, Ia.; W. J. Colton, manager of Sioux City (Ia.) store of Colton Co.; E. W. Vickery, district manager, Isko Co., Chicago; H. J. Zeager, assistant sales manager, Edison Electric Appliance Co., Chicago; F. M. Lemke, general manager, The Humphrey Co., Kalamazoo, Mich.; C. B. Fox, of the Crown Electrical Manufacturing Co., St. Charles, Ill.; Hallett Gildersleeve, of the Humphrey Co., Kalamazoo, Mich.; Joseph Irvine, of the Pneuvac Co., Worcester, Mass.; E. B. Jewett, assistant secretary, Jewett Refrigerator Co., Buffalo, N. Y.

ELECTRICAL MERCHANDISE DISPLAYS AT COLTON HOME UTILITIES EXPOSITION—

DES MOINES, IOWA

MARCH 2-12

1 9 2 1

COMPLETE LAUNDRY DISPLAY EAST WINDOW

NATIONAL EXECUTIVES AT COLTON HOME UTILITIES EXPOSITION

SWEEPER-VAC DISPLAY WEST WINDOW

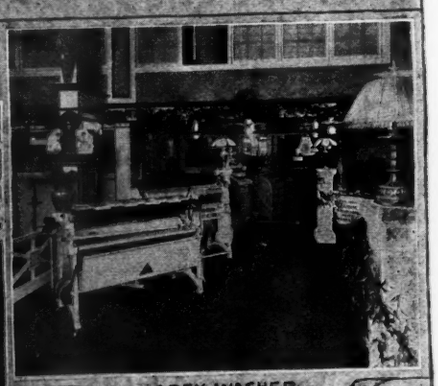
REST ROOM AND LAMP DISPLAY

CROWDS WATCHING IT IN WINDOW

ISKO-AND JEWETT REFRIGERATOR DISPLAY

ONE OF THE FUTURE DISPLAYS

DISPLAY OF A-B GAS RANGES, BLACK FINISH



APEX WASHER AND IRONER DISPLAY

NATIONAL MAZDA LAMP DISPLAY

DISPLAY OF A-B GAS RANGES, WHITE FINISH

HUMPHREY WATER HEATER EVEREADY HOT-POINT APPLIANCES

Synchronous Motors and Their Industrial Application*

Connections Used for Starting — Characteristics of Synchronous and Induction Motors—System Power-Factor—Energy Output and Phase Control — Typical Examples of Actual Service Conditions

By S. H. MORTENSEN

Electrical Engineer, Allis-Chalmers Manufacturing Co., Milwaukee, Wis.

Synchronous motors are started generally with the aid of auto transformers, the function of which is to transform the motor starting voltage to a certain percentage of the line voltage, and at the same time to reduce the current drawn from the line to a corresponding percentage of the motor starting current.

Let e = Motor starting voltage,
I = Motor starting current,
E = Line voltage, and
i = Line current.

Then the following equation gives the relations between motor voltage and current and line voltage and current:

$$eI = Ei.$$

To demonstrate: A 2200-volt motor is started with the aid of auto transformers on a tap giving 50% of the normal voltage and a motor current of 200 amperes. Determine the line current i as follows:

$$i = \frac{1100 \times 200}{2200} = 100 \text{ amperes.}$$

Auto transformers designed for starting purposes are supplied generally with a number of taps. Allis-Chalmers Manufacturing Co.'s standard auto transformers have 35, 40 and 50% taps, and with the aid of these taps, the following starting voltages may be obtained: 35, 40, 50, 60 and 65%. (See Fig. 6.) These auto transformers are rated in the number of amperes they will carry at any of the above taps for a period of 1.25 min. without overheating. If the starting current is less or more than the rated current the time limit must be altered accordingly. If the starting current is 65% of the rated current it may be carried for 3 min., but if it exceeds the rated current by 50% the starting time should not exceed 0.5 min. After the synchronous motor is installed the proper starting tap is determined by experiment, and a starting voltage that will bring the motor up to synchronous speed in approximately 1 to 1.25 min. is generally selected. In Fig. 7 is shown the connections of a synchronous motor with auto transformers.

The capacity and voltage regulation of the generator or the power system from which the motor draws its starting current must be such that the operation of other apparatus connected to the system is not disturbed when the motor is started. Disturbances result more frequently from the voltage drop of the system caused by the low-power-factor motor starting current than from the amount of power actually required for starting the motor. To make this point clear, the characteristic curves of a 937-kw., 2300-volt, 3-phase, 60-cycle turbogenerator are shown in Fig. 8. Assume that this generator supplies the power for starting a 750-hp., 2300-volt, 3-phase, 60-cycle synchronous motor. The power-factor of the motor starting current is 40%, and the motor is started with the aid of auto transformers

*Concluding installment of this article, the first of which appeared in Electrical Review, April 16, 1921, p. 613.

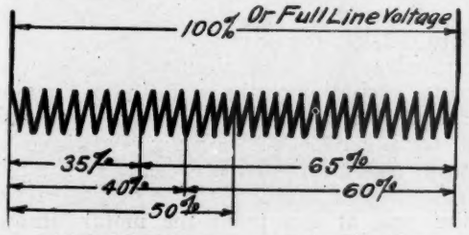


Fig. 6.—Diagramatic Sketch of Auto Transformer Tap Arrangement for Five Voltages.

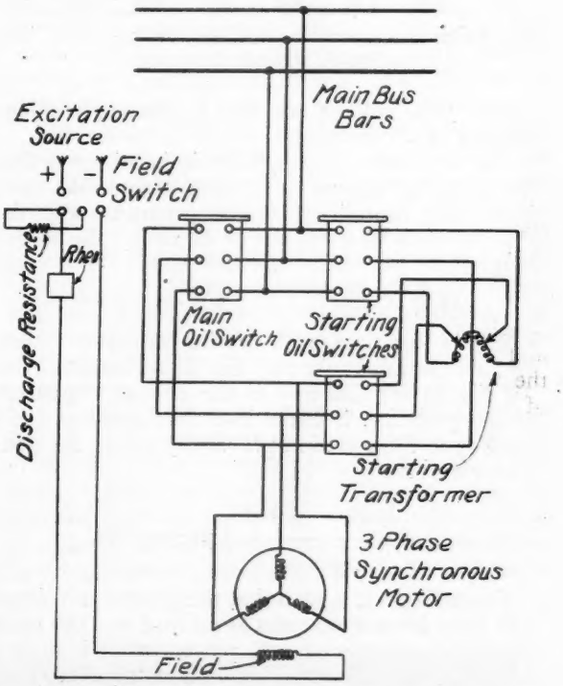


Fig. 7.—Connections of Synchronous Motor With Auto Transformer.

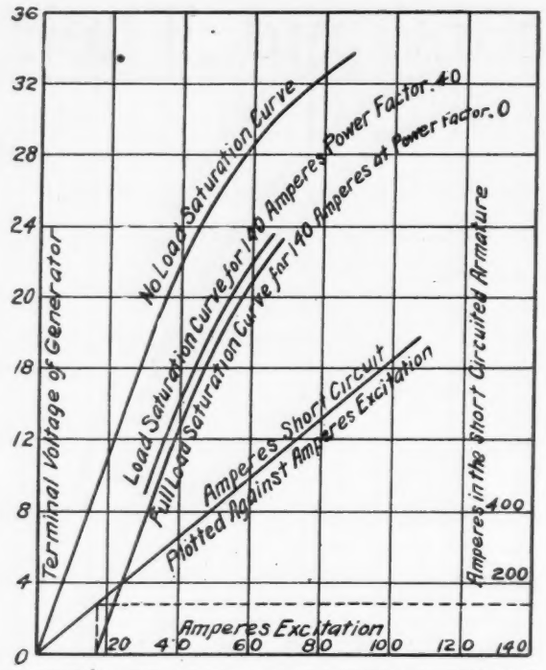


Fig. 8.—Characteristic Curves of 937-Kw., 2300-Volt, 3-Phase, 60-Cycle Generator.

on the 50% voltage tap, and is drawing a motor current of 280 amperes.

For the sake of simplicity it is assumed that the generator carries no other load and that there is no line drop between the generator and the motor. The starting power taken by the motor is then

$$1150 \times 280 \times 1.73 \times 0.4 = 223 \text{ kw.}$$

which is less than 25% of the generator rating, and should not cause any line disturbances. But the results are different if the voltage regulation of the generator is taken into consideration. According to the equation previously given, the generator current

$$i = \frac{1150 \times 280}{2300} = 140 \text{ amperes.}$$

From Fig. 8 it is seen that the generator voltage will drop from 2300 volts at no load to 1550 volts when 140 amperes at 40% power-factor is drawn from the generator. This is a voltage drop of

TABLE SHOWING RELATION BETWEEN ENERGY OUTPUT AND PHASE CONTROL.

Percent of rating in energy output.	Percent of rating for phase control.
100	0
98	20
90	43
80	59
71	71
50	87

32.6%, which would interfere with the lamps connected to the system and also cause heavily loaded motors to pull out. This example is not extreme, but shows what may be expected in power stations where the generator capacity is not appreciably in excess of that of the motors, be it squirrel-cage induction motors or synchronous motors.

Installation of an automatic voltage regulator such as a Tirrill regulator will in most cases eliminate the bad effects of the sudden voltage drop and restore the generator voltage to its normal value in the course of a few cycles. To insure the successful operation of a Tirrill regulator the exciter with which it works should have sufficient field leeway to raise the voltage across the generator fields to the value required for holding the terminal voltage constant during the starting period. Furthermore, the range of field excitation that the regulator is called upon to take care of should not appreciably exceed 100%. After a synchronous motor is excited and connected to the line its characteristics are well known. Its speed up to its pull-out point is constant and independent of the load it carries.

The overload capacity of a synchronous motor depends upon its inherent design as well as upon the value of its impressed voltage and field excitation. The longer the motor air gap and the smaller its armature reaction is, the larger are the loads that may suddenly be applied to it without causing it to pull out of step. An increase in the impressed motor voltage and excitation will likewise increase its overload capacity.

Standard synchronous motors are generally designed to stand from 60 to 100% suddenly applied overloads without falling out of step. It should be borne in mind that a low-reactance machine with a long air gap means an expensive machine. A long air gap is, furthermore, less favorable for a self-starting motor than is a short gap. It is therefore not advisable to specify the

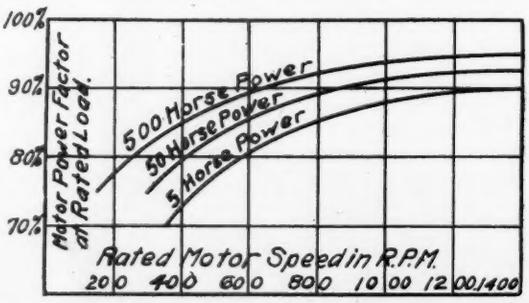


Fig. 9.—Average Power-Factor for Induction Motors Operating on 60-Cycle Service.

sudden overload capacity of the motor larger than necessary. If the load is gradually applied to the motor and its field excitation simultaneously increased, then overloads of from three to four times full load may be carried without the motor falling out of step. Heating of the motor windings would, however, limit such loads to a momentary duration. The squirrel-cage winding on a synchronous motor will increase its overload capacity and will tend to keep the motor in step during voltage and load fluctuations, and thus prevent the motor from hunting. For that reason all modern laminated-pole synchronous motors are supplied with a squirrel-cage winding whether they are self-starting or not.

It remains, finally, to discuss the influence of the motor excitation on the operating of the motor itself as well as upon the power system to which the motor is connected. For any given load on a synchronous motor its armature current is a minimum for a certain critical value of the field excitation, and at this point the motor draws a 100% power-factor current. If the field excitation is further increased the motor will draw a

leading current. If the excitation is decreased instead of increased the motor will draw a lagging current. Thus the controlling of the synchronous-motor excitation provides means for compensating a power system for wattless current.

In general, it can be said that a synchronous motor operates under its most favorable conditions when it supplies mechanical power at the same time as it acts as a compensator. It lends itself to these double functions with a comparatively small increase in heating. The theoretical relation between mechanical output and corrective output as a function of the full-load rating of a synchronous motor is given in an accompanying table.

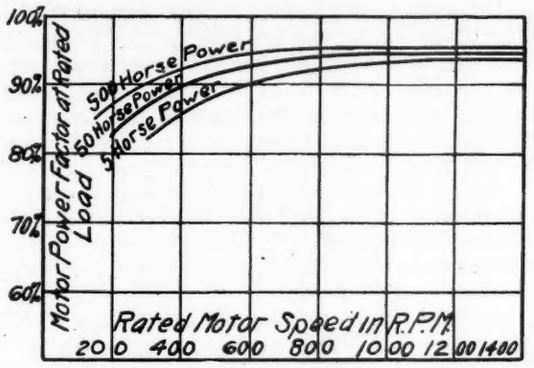


Fig. 10.—Average Power Factor for Induction Motors Operating on 25-Cycle Service.

These relations hold only if the motor in question is not limited through field heating, and it will frequently be found, especially in small high-speed motors, that the corrective rating given can be obtained only if the size of the motor is increased, or if the motor field coils are permitted to reach temperatures requiring fireproof insulation. In the latter case the fields are insulated with asbestos and mica and guaranteed to carry their rated load without injury, but no temperature rise should be given.

In the field of applications the synchronous motor must compete with the squirrel-cage induction motor. The latter, although otherwise very suitable for a great majority of industrial purposes, has the inherent disadvantage of including a large wattless component in the current it draws from the power system. Figs. 9 and 10 represent a fair average of the power-factors that will be obtained on modern squirrel-cage induction motors at different speeds. If the motors are partly loaded their power factors will be still lower, as may be seen from Figs. 11 and 12.

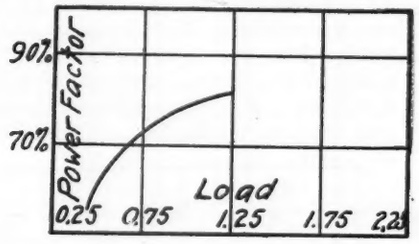
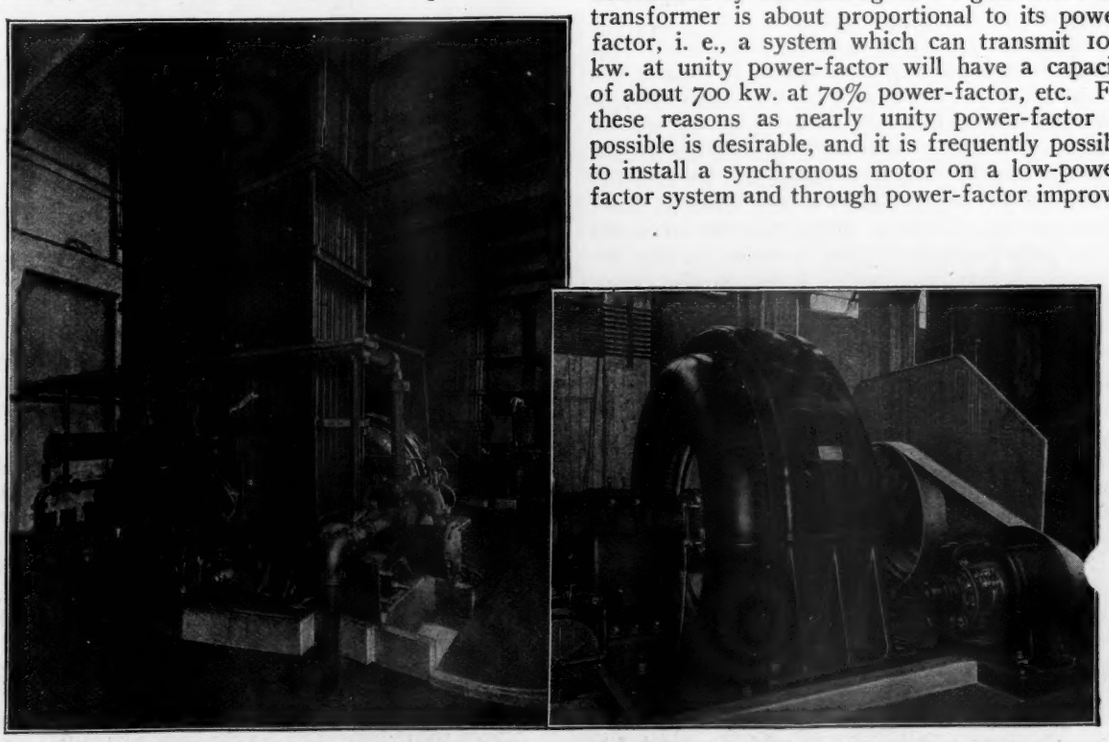


Fig. 11.—Curve Showing Power-Factor as a Function of Load on a 250-Hp., 300-R.p.m. Induction Motor.

The handicap that the low-power-factor current imposes upon induction motors results from the bad effect wattless current has upon a power system. This effect is two-fold: First, the capacity of the transmission lines, transformers and generators supplying the motors is reduced, and, secondly, the voltage regulation of a system is very much impaired through the influence of wattless current. The capacity of a system as determined by the heating of its generators and transformer is about proportional to its power-factor, i. e., a system which can transmit 1000 kw. at unity power-factor will have a capacity of about 700 kw. at 70% power-factor, etc. For these reasons as nearly unity power-factor as possible is desirable, and it is frequently possible to install a synchronous motor on a low-power-factor system and through power-factor improve-



Synchronous Motor, 2400 hp., 214 r.p.m., 12,000 Volts, Driving Pulp Grinders in Plant of Cliff Paper Co., Niagara Falls, New York.

ment obtain enough additional capacity to operate a motor.

Although the voltage regulation of a system can, as already mentioned, be much improved with the aid of automatic voltage regulators, it is difficult to maintain uniform voltage on a system having a low-power-factor induction motor load. By using synchronous motors, however, the power-factor may be adjusted to any desired value within their capacity, and by combining synchronous motors with automatic voltage regulators very close voltage regulation can be obtained on any part of a power system. This method has the advantage over control by station regulation of combining load carrying and voltage regulation into one piece of apparatus.

It is apparent that a synchronous-motor load is very desirable on any power system. Motor generators and frequency-changer sets, air compressors, pulp grinders in paper mills, refrigerators, line shafts, pumps and in fact almost any constant-speed machine that can be started light can be operated to advantage by a synchronous motor.

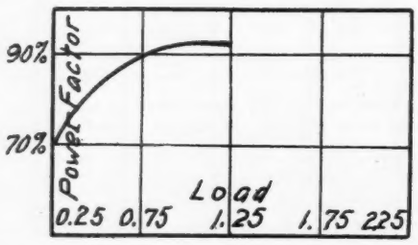


Fig. 12.—Curve Showing Power-Factor as a Function of Load on a 250-Hp., 500-R.p.m. Induction Motor.

The following brief comments, descriptive of typical synchronous-motor applications, will serve to indicate where and how such equipment is used: In one case a 2400-hp. motor, operating at a speed of 214 r.p.m. was used to drive a pulp grinder. The stator of this motor is wound for 12,000 volts, 25 cycles, and takes current directly from the high-voltage circuit without the use of step-down transformers. The motor is started with the aid of auto transformers. Its starting conditions are exceptionally severe since at times the motor starts with a large quantity of wood in the pulp grinders. This, however, is not objectionable since the motor takes current from a large power system.

In another case a 565-hp. motor was used to drive an air compressor. During starting the compressor valves are open and the motor is not loaded until after it is in synchronism. This, of course, reduces the starting current to a comparatively low value and makes it possible to get satisfactory operating conditions even if the capacity of the power station is not widely in excess of that of the synchronous motor. This application is typical of the operating conditions to which synchronous motors are suitable.

A great many similar applications may be found where the adaptations of the mechanically driven apparatus to the requirements of synchronous motor drive may be accomplished. Through such arrangements the range of industrial application of synchronous motors may be widely extended to the equal benefit of the power distributing company and its customers.

INDUSTRIAL COST ASSOCIATION TO HOLD CONFERENCE.

Economic Influences on Cost Practices and Uniform Cost System Among Subjects to Be Discussed at East Aurora Meeting.

A national "Golden Rule" conference of industrial executives will be held in East Aurora, N. Y., May 26-28, under the auspices of the Industrial Cost Association. Call for the session was sent out recently by A. A. Alles, Jr., of Pittsburgh, national secretary, as the result of a referendum in which more than 1000 plant executives, representing many millions of invested capital, voted.

The conference members will be told, according to Secretary Alles, that they will have to put the Golden Rule into effect in solving their production problems before they can remedy conditions which, he said, are described by manufacturers generally as "chaotic and becoming increasingly revolutionary." The National Conference is a last resort, Mr. Alles said, in an attempt "to strike bedrock and work out of an unprecedented situation." The association members, many of them competitors, are using Golden Rule tactics in following out their pledge to mutually interchange information on production and cost methods.

The Association officers are working in conjunction with Secretary of Labor Davis and Assistant Secretary of Commerce Houston. The Association has been asked to take a hand in the Federal Trade Commission's order whereby steel-making companies will have to report their production costs. This ruling was cited by Mr. Alles as being "revolutionary and as giving an inkling of what may be expected in the next decade."

Industrial control through costs, as practiced today, is a product of the last 12 yrs., during which period there has not been a precedent established that could possibly serve as a guide during the present period of high costs and low prices, excessive investment and limited production. The structure of cost determination must be altered to meet changing economic conditions, and the foundation for this will be laid at the East Aurora conference. Executives qualified to speak for and represent their own manufacturing companies will work out new policies and a change in routine methods.

Some of the subjects to be discussed are "Economic Influences on Cost Practices"; "Burden Reserve and Its Application"; "Measuring Human Cost"; "Uniform Cost Systems and Their Weaknesses," and "The Standardization of Cost Terminology."

One of the most important problems before the conference will be the working out of a plan whereby the American manufacturer who does not know his costs, of which there are said to be over 225,000 in the United States, can receive the assistance of other manufacturers in kindred lines who, in turn, will benefit by the elimination of ignorant competition.

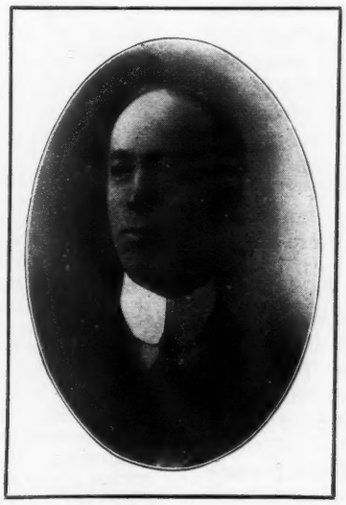
American manufacturers are facing competition, both home and foreign, such as they have never known, said Secretary Alles. Of the European countries German competition is the most feared, because of their lower raw material and labor costs.

Safety in Relation to Electrical Appliances

Study and Elimination of Fire and Accident Hazards Is an Art Rather than a Science—Methods of Insulation—Paper Presented Before Recent Meeting of American Soctety of Safety Engineers

By DANA PIERCE
Vice-President, Underwriters' Laboratories.

The subject of safety or of accident hazards with reference to electrical appliances is one which has received a great deal of attention in recent years but is new compared with the study of fire hazard of electricity. The terms "accident hazard" and "fire hazard" are used in their common colloquial sense, no formal definitions or distinctions being considered necessary here. The results of the study of accident hazards are embodied in the National Electrical Safety Code of the U. S. Bureau of Standards and the generally accepted code on fire hazards in the National Electrical Code of the National Board of Fire Underwriters.



Dana Pierce.

The Safety Code is about 4 yrs. old and the Fire Code is about 24 yrs. old. Both codes are the result of years of study by many persons and associations, and both are to be regarded as representing the best present consensus of opinion while being susceptible to further revisions in the light of changes in the art, developments of invention and the accumulation of experience. The last edition of the Safety Code is that recently issued by the Bureau of Standards, the third edition dated Oct. 31, 1920.

Electrical Safety an Art Rather Than a Science.

Uses of electricity are so numerous and the number of devices and machines employed is so great that anything like a complete discussion is manifestly impossible in a brief article. Furthermore, the methods by which safety may be secured are matters of detail varying with the device, its location, size, method of use and the sort of person using it.

Electrical safety is an art rather than a science. It involves as do all safety efforts, a large human element in addition to its economic and technical phases. What the employer can do and can pay for is one element. Habits and necessities of employes as well as their welfare must be given consideration. Perfection is unattainable even if we could all agree what it is.

Electricity may cause accident in just two ways; by shock and by burns. To these must be added the mechanical causes of injury from moving machinery and the like which are possible in all apparatus whether electrical or otherwise.

Protection against shock is obtained by insulating current-carrying parts which might be touched, and the possibility that the insulation may at times be defective indicates the need of special precautions in some cases. Most power circuits are so arranged that some current will flow to the ground through the body of a person touching the live parts. By "ground" is meant not only the earth itself but any floor, pipe, wire or other conducting object in more or less direct electrical connection with the earth. Prevention of shock, therefore, requires that we consider such objects as possible paths for current at all times. Dirt and moisture increases the liability of such a path being established for a dangerous current through a person's body. This is still another argument pointing to the necessity for good housekeeping.

The hazard of shock increases with the voltages. There are some well authenticated cases of fatal shock from a potential of 110 volts, the usual lamp-circuit voltage. The danger is believed to be small to persons in fair physical condition unless the contact made with the circuit is very good and long continued. There is more danger, of course, in 220 volts. At 440 volts and over the hazard becomes very real and anything over 600 or 1000 volts must be treated with respect and constant caution. It is not possible to say just where real danger begins. By these voltages we usually mean, in safety work, the voltage from the circuit to the ground and not the voltage across the two sides of the lines, but this distinction is not uniformly made.

Protective Measures Taken to Safeguard Electric Appliances.

There appears to be no very reliable data as to the amount of current that will kill. This varies with the voltage. It at least appears certain that the killing current under most conditions and at common voltages is very small if measured in amperes; small, that is, as compared with the currents taken by common devices, lamps, household and factory appliances, small motors, etc. The amount of current sufficient to cause fatal shock is sometimes stated as 100 milliamperes at 600 volts.

Protective grounding is one of the chief

methods of safeguarding electric appliances and is practiced in two general ways; first, by connecting one wire of the distributing system to the ground and, secondly, by grounding the inclosures, frames and other metallic parts of equipment.

Grounding of the circuit has the effect of limiting the difference of potential (voltage) which can exist between other wires or connected apparatus and the ground. The exact conditions for grounding circuits and the methods of doing it should be studied in the two codes, both of which deal with it. The details cannot be explained here. Grounding circuits is especially important when a normally low-voltage circuit such as 230 volts is exposed to possible contact at some points with a circuit of higher voltage. An ordinary type of transformer for a-c. power distribution receives power at 2300 volts on one of its windings and delivers 230-volt power from the other winding. A failure of insulation between these windings in the transformer, or a cross between low and high-voltage wires outside, will impose the 2300 volts on the 230-volt wires and everything connected to them. Grounding the low-voltage side gives this high voltage a path to ground where it is harmless. Evidently, the permanence and excellence of the ground connection are of prime importance and there should be no fuses in the ground wire to open up and remove the ground.

In years past, there has been no little objection on the part of fire underwriters to grounding circuits, but this has now passed and protective grounding of circuits is now very general and is being adopted rapidly in territories where it has not before been favored.

City authorities and others in control of water companies long objected to grounded power circuits because of supposed injury to underground water-pipe systems. More recent investigations have proved these fears almost wholly unnecessary and the former objections are now rarely made. It cannot be too clearly stated that the proper grounding of power circuits under all conditions requires skill, experience and a thorough knowledge of electrical power theory and operating. Correctly done, grounding of circuits is one of the chief safeguards at our disposal.

Two General Methods of Insulation Against Electrical Hazard.

Protective grounding of inclosure frames and the noncurrent-carrying metal parts of equipment is a simpler matter. In general, its purpose is to prepare in advance a current path to the earth so that, in the event of the failure of insulation making the inclosure "alive," the current may have a route to ground other than through the body of a person. In other words: if a motor frame is connected to the ground it will have the same potential as the ground on which a man touching it stands and, therefore, current will not pass through him to the ground. Where such an inclosure cannot be grounded for operating or other reasons, then the man must be insulated by a platform, mat, gloves or some or all such means. Of the two general methods, the grounding method is the better where feasible.

There is one aspect of grounding inclosures, however, that is not always remembered. A switch in a grounded box is a case in point. If the operator of the switch in a grounded box touches or comes near live parts, the proximity of the grounded box may actually increase his danger. If the box is closed and grounded he cannot get hurt from it. Therefore, external operation of the device by an outside handle, for instance, is a natural complement to the inclosing of the device.

For the purpose of protection against the other main direct hazard from electrical appliances—burning—the obvious recourse is the inclosure of apparatus in tight cases or their isolation to prevent approach to them when operating. To these may be added the use of goggles and protective clothing. In many cases, remote-control of switches and other current-breaking devices lessens the hazard and these forms of appliances are becoming more and more general.

In addition to the hazards from shocks and burns as essentially electrical effects, we may briefly mention some other hazards which are of a more mechanical nature. On these we quote from a recent safety standard of the Electrical Safety Conference.

Explosion of fuses.—Fuses used to protect apparatus against overloads and short circuits, especially on large power circuits and with the apparatus near the generating station, occasionally explode with great violence. Such a condition is a possible cause of accident.

Gas or dust explosion.—Where apparatus is in an atmosphere containing certain quantities of inflammable gas, or inflammable dust or flyings, there is danger that an arc or flash at the controller may ignite this mixture, causing a fire and sometimes an explosion.

Moving parts of a controller.—Persons near the apparatus may be injured by being struck by the handles or levers of circuit-breakers and similar parts of the controller which may move suddenly and unexpectedly, unless these parts are properly located and guarded.

Phase reversal.—With certain classes of machinery, such as elevators, cranes and hoists, the motor and load may not move in the expected direction with reference to the operating lever or handle of the controller because of an accidental phase reversal of the supply circuit. This may result in injury to persons because of unexpected direction of motion or confusion of the operator; it may in some cases result in failure of the limit switches and in injury to the machinery itself.

Unexpected starting.—Persons may be injured by moving parts of the motor or driven machinery should the motor be started unexpectedly by another person, or by restoration of voltage after failure of voltage.

Over-speed.—Motors and motor-driven machinery may run at excessive and dangerous speeds because of some change in operating conditions, such as—

(a) Separately excited d-c. motors losing their excitation.

(b) Series motors losing their load.

Lack of emergency stop at point of operation.—The operator of such machines as mixing rolls and calenders may be caught by the machinery and seriously injured if the machine is not immediately stopped by an emergency device.

Over-travel.—Certain machinery, such as elevators and some hoists, unless stopped within certain limits may do serious damage to persons and to the machinery. Since the operator cannot be relied upon to stop the machine at the limits, some device such as a limit switch must be arranged to do so automatically.

Failure of power.—Failure of power may cause injury to persons with such machines as cranes or hoists unless the machine is equipped with suitable device to stop and hold the load.

Current overload.—Excessive current by overheating some part of the motor, controller or wiring may ignite nearby combustible material or so damage the insulation as to leave the equipment in a dangerous condition.

In prescribing accident-prevention rules for electrical apparatus it is necessary to distinguish quite clearly several classes of persons to be protected and the methods employed must vary according to whether all of these classes or only one of them is involved. The classes may be divided into qualified persons, operators, and other persons.

Necessity of Adherence to Strict Rules to Promote Safety.

By qualified person is meant one who is familiar with the construction and operation of the apparatus and who is assumed to have some appreciation of the hazards involved. Skilled electricians, inspectors and other more or less expert persons may properly be included under this term. The ordinary shop foreman should not be considered a qualified person unless he has special knowledge of electrical matters and experience in dealing with them.

The qualified person is supposed to be able to make inspections and adjustments of apparatus, to enter rooms where high voltage equipment is installed, to open or remove inclosures for replacement of fuses and in general to perform those operations necessary to the general maintenance of equipment. The qualified person, of course, is entitled to all the protection which the circumstances of his work permit, but he cannot be protected under all conditions and a certain degree of dependence must be placed upon his individual intelligence, knowledge, skill and experience.

Many of the safeguards which it is possible to place around electrical appliances will fail of their purpose if all sorts of persons are permitted to perform this special and more hazardous operation. Such qualified persons should have sole charge of the locks, rooms, guards, disconnecting switches and other protective devices. An ordinary workman should be prohibited from performing the duties of a qualified person.

No safety program can successfully be carried out without constant attention to the human element and the distinction between the expert and the ordinary employe. The proverb that "a little knowledge is a dangerous thing" finds no better illustration than in the risks incurred by a person with imperfect knowledge of electrical affairs attempting to operate electrical machinery.

Special Care and Protection Must Be Afforded the Inexperienced.

By operator we mean a person who is authorized to actuate or handle the equipment. He uses the equipment to run his machine and, as he probably knows little about the electrical device, the protection afforded him must be more complete and must be maintained more persistently than for the expert. He may properly open and close switches directly affecting his work but such switches should be so inclosed that he cannot expose himself to shock or burns. He may be trusted to replace fuses only when provision is made so that he need not handle any live parts in so doing.

The third class of persons includes the ordinary workman or passerby who may inadvertently touch electrical apparatus or be affected by its failure in operation. As his attention will generally be on something other than the electrical devices, and he must be assumed to have no appreciation of the dangers to which he may be exposed, we must guard against his injury even more carefully. Inclosures and the insulation of apparatus as far as practicable are in his interest.

When we attempt to provide protection we may do it either by constructing each part of the apparatus so it includes the necessary safeguards in itself, or we may remove apparatus which presents hazards, or protect it by guards or gratings or by putting it in separate rooms. It is not necessary that the manufacturer of an electrical device should make it so that it can always and everywhere be used in safety. To do so would add an intolerable expense to equipment which would defeat the purpose.

If apparatus cannot be placed so high on the wall, or surrounded by guards and screens to make it safe, then, of course, the protective features must be built into the device itself. It is an economic question in every given installation as to how the results for safety may be secured with certainty by a proper combination of protection by construction and protection by installation. It is just here that the skill and experience of a safety engineer has one of the best opportunities.

The last few years have shown a very notable increase in the interest of manufacturers in providing safer electrical equipment. Inclosed or safety switches are now available in a great variety of forms, many obtainable at a price little above that of open switches. Several of the larger companies are rapidly redesigning whole lines of switches, circuit-breakers, motor controllers and other power apparatus to provide the safeguard prescribed by safety rules. In fact, it may be stated that one of the most strongly marked tendencies of present-day electrical design is in this direction of safeguarding persons from injury. Like all movements for the betterment of society, this development is marked by animated and sometimes violent disagreement as to what is necessary, and as to the rate at which progress can be made without imposing undue expense upon industry.

As applied to electrical equipment for ordinary houses, offices and other buildings than factories, the present tendency is strongly in the direction of making and installing wires and connecting devices so there will be no exposed live metal parts and no other metal parts liable to become alive which are not effectively grounded. Thus the present tendency is to ground fixtures to the conduits or other supports rather than to insulating them. The ordinary lighting panelboard formerly presented, when one opened the door, a mass of live copper parts, switches and fuses. The present safety panelboard shows only insulated handles and covers either of insulating material or of grounded metal. A wholly inexpert person can thus use them for ordinary purposes with practical safety. The frames of electric ranges and other stationary equipment are now usually grounded in some manner.

Work of Perfecting Safety Rules Goes Steadily On.

Some of the most important questions in electrical safety have to do with the installation and operation of power lines and connected outside apparatus, but these are questions which it is im-

possible to discuss even briefly in a paper of this sort. The National Electrical Safety Code treats of them exhaustively.

State and municipal commissions throughout the entire country are interesting themselves more and more in safety rules for electricity. In several states special codes have either been drawn up or are now in preparation. Some of these are combinations of the rules of the fire code and of the safety code. There is still much difference of opinion as to the desirability of attempting such a combination of rules. The Associated Manufacturers of Electrical Supplies, the Bureau of Standards, Electric Power Club, National Workmen's Compensation Service Bureau and Underwriters' Laboratories have associated themselves in what is known as the Electrical Safety Conference and through special committees are developing a very useful set of detailed standards or safety codes for electrical appliances and systems. One such code—that on industrial-control equipment—has been published and is now available for distribution. Other codes in process will cover inclosed switches, rotating machinery, switchboards, circuit-breakers and other topics.

Underwriters' Laboratories is prepared to list electrical devices as approved either from the point of view of fire hazard alone or from the points of view of both fire and accident hazard. In all its examinations and tests it pays attention to the accident hazards involved and aims to follow the best standards for the protection of persons as well as for the protection of property. In its testing, constant attention is given to the problems of insulation and, of course, to the mechanical excellence and durability of appliances.

Elaborate special equipments have been provided in both Chicago and New York for thorough testing of fuses of all types. These equipments involve the use of large power batteries on which fuses are short-circuited under conditions representing the most severe service conditions liable to be encountered. These equipments are in almost constant use in testing the developments of new fuses and in check tests of standard lines. Switches are put through operating tests to show that they have adequate margin of safety as switches, are adequately insulated and are strong enough to stand up under hard usage.

Similarly, sockets, circuit breakers, heaters and an endless variety of special appliances, as well as of the standard wiring devices, are under standard test either as new developments or in the use of the Laboratories follow-up service and factory inspection and labelling. With the cooperation of the wire industry, code wire is continually tested at the factories where it is made under the Laboratories' supervision with the result that code wire today enjoys the reputation of dependability.

Underwriters' Laboratories is in constant relation to the various branches of the electrical manufacturing industry through its Industry Conference, on which manufacturers are represented. The Laboratories also co-operate actively on the committee work of numerous electrical associations and with state and municipal officers. Through these channels more and more work is being done in electrical safety and many intricate and difficult technical and economic questions are being worked out to a generally acceptable conclusion. The desirability of having tests both for fire and accident hazards conducted by properly qualified laboratories where experience and standards can be registered is evident and its utility is being daily demonstrated.

Changes in the electrical arts are so rapid that this work can never reach a final conclusion. New inventions, applications and methods appear daily. Electrical energy is being utilized each year in wider fields and is affecting interests of more industries and of more people. Electricity can be made safe and it may fairly be claimed that the developments in safeguards are keeping well up with other developments in the art.

The extremist who demands immediate perfection has not yet reached his goal in electrical safety affairs any more than in any other human relations. He serves a useful purpose in pointing out the road but his ideas must be supplemented by the constant level-headed attention to details and to the practical limitations imposed by questions of cost and of habit. Perhaps we may say that the ideal safety engineer is the man who combines an ardent enthusiasm for perfect protection of his fellows against the accidents of life and work, with a sound knowledge of the principles of science and its practical applications, and utilizes them both with that common sense which is a measure of a man's wisdom and efficiency.

SOME FIGURES FOR DISHWASHER SALESMEN.

"Have you ever figured out," asks a housekeepers' journal, "how much dishwashing costs in dollars and cents? The expense is amazing. In the average home this brainless, monotonous drudgery consumes over 800 hrs. each year of somebody's time—either the housewife's or a servant's. By careful test and observation it has been ascertained that 40 min. is the average time required for washing the dishes. This is equivalent to having one person work steadily, 8 hrs. a day, 7 days a week, for 3 mo. out of the year.

"Employ a servant to do all this, and you will have to pay at least $12 a week and 'keep,' which includes food, room, washing and incidentals, and amounts to $8 per week at the lowest. Her time will cost at least $0.25 an hr. At this rate the 800 hrs. of dishwashing by a servant will cost $200 during the year. A pretty price for a distasteful job! And the housewife's time is worth so much more that if she does it herself we must consider the dishwashing by hand an even more expensive item."

ELECTRIFICATION OF PHILIPPINE RAILROADS.

In regard to the plans of the Manila Railroad Co. for the use of electric motive power on its road, the bulletin of the Philippine Government Commercial Agency in New York City states that the electrical power will be developed from the Agno river, in central Luzon, which is believed to possess a potential capacity of from 12,000 to 15,000 hp. A thorough topographical survey of the entire waterpower site is being undertaken, and early reports of the survey would seem strongly to point to the feasibility of the project.

EDITORIAL COMMENT

Encouraging First-Class Installations

In providing estimates for prospective customers the electrical contractor, when dealing with the individual house owner, should point out the difference in cost for different classes of wiring, and should never assume that the customer desires the cheapest kind of an installation. Where the advantages of better work are properly presented the majority of customers will order it in preference to the cheaper methods. Frequently they do not do so, however, owing to a lack of appreciation of the real differences involved in the work, which the contractor has neglected to fully explain to them.

Especially in already-built houses, if rigid conduit is out of the question, a flexible conduit or armored conductor should always be advised in preference to knob-and-tube work. The former construction has the advantages of being more permanent, of requiring less tearing up of floors and walls, of being fool-proof, and of being safer as regards the hazards of fire and shock, damage from rats, etc.

The question of the general method of wiring having been settled, suggestions should be made regarding details which will affect the cost to some extent, but regarding which a slight added expense is always worth while when the benefits of appearance, convenience, etc., are considered. Thus the position of the service entrance, the meter and the main switch should be considered, the basement having usually been found the most convenient location for these. A standard meter board is usually worth the expense which it involves. It ought always to be pointed out that future requirements are likely to exceed present needs and that provision should be made for heating devices which may later come into use, and possibly for extensions. This means a sufficiency of wall and baseboard outlets, and leads of enough carrying capacity for all future requirements. It also means provision for a larger number of circuits than would be necessary if the entire initial load were crowded onto the minimum number permitted by the rules.

The question of switching should receive detailed attention, as the great convenience of controlling hall lights, and even certain of the rooms, from more than one point is well worth the expense involved. The general use of wall switches should be encouraged. Suggestions regarding the provision of lights in places that might otherwise be neglected, such as closets and pantries, should not be overlooked.

By taking up all of these details with his customer the contractor will render a service that will be appreciated in the future, which will enable him to do a job that he can refer to with pride and satisfaction and which will at the same time usually increase the size of his contract.

Local Co-operation Among Contrator-Dealers

The electrical contractor and dealer is coming to realize more and more the value of organization. This is manifest not only in the activities of the national and state associations, but in many local organizations which have helped to weld together the interest of local contractor-dealers and prevent the antagonism and reckless price cutting which has so often occurred in the past and has, at such times, left a record of disaster in its wake. The electrical contracting business, as well as merchandising, has had to meet problems common to a number of other industries and the trial has usually shown that these problems can best be handled by co-operation, whereas the individual, alone, can do little to improve local conditions. It sometimes seems to be a slow matter for such associations to accomplish anything, but it is really necessary, first of all, for men to get acquainted before they can achieve much in the way of co-operation, and there must be a real intent to achieve something which will stimulate a desire for participation in association activities. There must also be what often appears as a very unselfish willingness for service which, however, in the end usually redounds to the benefit of those who take an active part in securing the desired results.

Much has been accomplished by organizations of electrical contractors in the past and much is being accomplished today, but there still remains a great deal to be done and there are many communities in the less populous centers where the local contractors are hardly on speaking terms with each other. Thorough organization and co-operation is needed, both nationally and locally, and there are many problems which can be met by local associations better than by the national organization which, too, has enough problems of its own to absorb all of its available funds and energy. The sooner electrical contractors learn to organize and to co-operate through local associations, the sooner will the problems of the electrical

industry in their respective districts be solved. In this they may undoubtedly depend upon the full active support of the National Association of Electrical Contractors and Dealers, whose officials are doing such magnificent work, and upon the co-operation of the various state associations which in general are functioning equally well in their respective spheres of influence.

Electrical Salesmanship by Mail

There appears elsewhere in this issue of ELECTRICAL REVIEW an article on the subject of salesmanship as taught to salesmen and clerks of electrical contractor-dealers through a correspondence course established by a large manufacturer of nationally popular appliances. The article was prepared by the able and energetic supervisor of this correspondence course, known as the Edison School of Salesmanship, at the request of ELECTRICAL REVIEW after a careful investigation which disclosed the unselfish motives and principles of the institution for the general welfare of the electrical industry.

Although the salesmanship school was founded by and is conducted entirely within the precincts, and at the expense, of one of a large number of appliance manufacturers, there is no restriction of membership or enrollment. No tuition fees are assessed, whether the student is engaged in selling the product of the company conducting the school or competing products. The same impartial information and instruction applicable to the demonstration and sale of any make of electrical appliance is dispensed to all of the students. It was found that the enrollment contains the names of many contractor-dealers as well as their clerks and salesmen. There are even a few students who are now employed in other commercial lines, but who hope later to enter the field of electrical appliances.

The establishment of this school by one electrical manufacturer for the benefit of those who sell competing products as well as his own is another indication of that new spirit within the electrical industry which is in a measure submerging selfish individuality for the greater benefits of collective effort.

Worth the Cost

In the electrical industry there have been many ups and downs recently—more downs than ups. The genuine misapprehension which existed at the beginning of the year is, however, beginning to give way to a more settled policy of conservative expansion, and in many parts of the country inquiries are looking up. Manufacturers, electrical supply jobbers and dealers are all securing a little more business, but while there are many orders, the aggregate volume is small and the cost of handling is considerable. The impulse of a better buying mood is apparent, and the promise is that this tendency will be maintained and gradually accelerated. In this emergency the electrical industry must keep up its courage and, rather than make extraordinary sacrifices in suspended effort and profit, put its selling organization with all the vigor and intelligence at its disposal behind the determination that the things to be done are necessary and worth the cost. Only in this way can the investment, good will and standing of years be adequately maintained.

Cutting Out Plaster for Ceiling Outlets

In wiring an old building much trouble is caused on account of the brittleness of old dried plaster, which crumbles away around places where outlets are to be located. Therefore, instead of forming a neat, round hole for outlets an irregular hole is frequently left and the plaster drops in an unexpected way, making a very bad mess. To cut plaster for ceiling outlets in such buildings one contractor states that he has used the following method. He takes a ceiling plate and files teeth in the edge of it so that it looks like a small circular band saw. Then he breaks out the center knockout and in the center hole fastens a piece of 1-in. pipe (5 or 6 ins. long) by splitting the end and bending the sections over. With an old brace he fastens the chuck end in the end of the pipe. The outfit is then used to cut the hole in the plaster exactly where the outlet is to be located. In the case of combination outlets the top of the pipe centers the tool by slipping over the gas pipe. In straight electric outlets a stout nail driven in the center of where the outlet is to be located may serve to center the tool. In either case, by turning slowly the saw edge cuts a neat hole without crumbling the plaster and the plaster that drops out falls into the ceiling plate, which acts as a saucer or dish to catch it.

Madame Marie Curie, Radium Queen

Madame Curie succeeded in isolating radium in 1910 after she had discovered, through researches made in association with her husband Pierre, this remarkable element in 1898. She is now visiting the United States and will receive public and university honors which she has well earned by intelligent toil and experiment. She has lived to see the element she isolated employed in a rapidly increasing field of usefulness and in alleviating the condition of those stricken and diseased. Popular as well as scientific recognition of her most valuable work is accorded while she is still among the living. The wonderful power

that she disclosed has deeply influenced theories and profoundly impressed the scientific world.

While in this country Mme. Curie will receive as a tribute to her genius and to the scientific importance of what she has accomplished a gram of radium valued at more than $100,000.

Mme. Curie is called "The Radium Queen" in her own country, and is beyond doubt the greatest of women scientists. Upon the death of her husband, who was killed in an accident in Paris, in 1906, she was elected to succeed him as professor of physics in the Sorbonne.

The most cordial and sincere welcome will be extended to Mme. Curie throughout the United States, and her visit should give added incentive to students and experimentors in our world of science.

Edison's Questions

That ever interesting and talented friend of mankind, Thomas Alva Edison, is just now the center of comment and suggestion. Quite a storm of wit, protest and sarcasm has been precipitated by the publication of his "Intelligence Test"—a carefully prepared and unique list of questions which are submitted to all applicants for employment in his establishment. The press of this country and other countries have found it a delightful and prolific source of study and protest, and editorial and news columns are devoted to this new industrial test of knowledge and wisdom. Some 10 yrs. ago Edison said to this writer he believed there was a greater lack of good chemists than in any other branch of science and it is evident that the distinguished inventor in his test questions was somewhat guided by this belief. A chemical friend of ours told us that from his knowledge in his profession he was able to answer a little over 85% of these questions. We present a few of them as indicating the various fields covered:

1. Who discovered how to vulcanize rubber?
2. With what substance is radium always associated?
3. Who discovered the x-ray?
4. Who invented printing?
5. Who invented the modern papermaking machine?
6. Who was the most famous maker of violins?
7. Who wrote Les Miserables?
8. Who was "the father of American railways?"
9. Who discovered the Pacific Ocean?
11. Who was the founder of The New York Herald?
12. Where is Manchuria?
13. Where is Magdalena Bay?
14. What is the greatest depth ever found in the ocean?
15. Where was Lincoln born?
16. Of what are violin strings made?
17. What newspapers and magazines do you read?
18. Of what is porcelain made?
19. What substances are used in the manufacture of sulphuric acid?
20. What are the ingredients of good white paint?
21. How is celluloid made?
22. What is the hardest known wood?
23. In what part of the world does it never rain?
24. Where is the largest telescope in the world located?
25. What is a monsoon?
26. How much is a troy ounce of gold worth?
27. At what speed does light travel?
28. What is the best grade of cotton grown?
29. How far is the earth from the sun?
30. How far is it by ordinary oceanic routes between New York and Liverpool?
31. How is leather tanned?
32. How is window glass made?
33. How is artificial silk made?
34. Who discovered the laws of gravitation?
35. Name the three principal alkalis.
36. What is the difference between anthracite and bituminous coal?
37. From what country do we get most of our cork?
38. From what country do we get our borax?
39. From what country do we get our platina?
40. Where does most of our quicksilver come from?
41. What is the greatest wool producing country in the world?
42. In what state are located our chief copper mines?
43. What is copra?
44. What is used to cut the facets of diamonds?
45. What are felt hats made of?
46. If Rhode Island is the smallest state in the Union, what is the next, and the next to that?
47. Where does most of our rubber come from?
48. What is zinc?
49. What is the name of the acid in vinegar?
50. Where are condors found?
51. What fabric is used in auto tires?

Our esteemed daily contemporary, the New York *Herald* comments editorially in a recent issue as follows:

Suppose, for example, that Mr. Edison is put upon honor this morning not to resort to the reference library, and is then confronted not with 150 test questions but only with the subjoined 10, with 10 min. in which to overhaul his memory cells:

1. Where was the Serbonian bog and what entire armies were sunk therein?
2. Who wrote "Mary had a little lamb?"
3. In what town in Illinois did Abraham Lincoln deliver his longest speech in the debate with Douglas?
4. Where is Sidi Bou Said?
5. Give the test of the Curse of Ernulphus.
6. What was the date of the invention of the ordinary cartwheel?
7. What is a bannalanna?
8. When and why was the digamma dropped?
9. How many white beans, on the average, to the bushel?
10. Who struck William Patterson, and why?

We shall not think less highly of Mr. Edison's mentality—that is a word in fashion—if he frankly confesses that without recourse to adventitious aid he must flunk on every one of the ten.

The principle is simple enough and obvious enough. The wise employer will try to ascertain the quality of the intelligence rather than the mere contents of the memory of those on whose assistance he expects to depend; the sharpness of the blade of the plane, not the bulk of the pile of shavings.

And, anyhow, we are gratefully indebted to Mr. Edison for having added to our information and entertainment, and diverted our minds from war troubles and after-war problems, and we extend to him our profound appreciation of the many qualities that make him conspicuously our most versatile and uniquely interesting American.

THE WEEK'S NEWS

Reports of Important Meetings, Developments and Other Happenings of the Electrical Industry and Its Allied Interests

RESIDENCE LIGHTING EXHIBIT TO BE CONVENTION FEATURE.

Lighting Sales Bureau of N. E. L. A. to Demonstrate Lighting Effects and Their Possibilities at Big Chicago Convention.

The Lighting Sales Bureau of the National Electric Light Association, under the chairmanship of O. R. Hogue, has decided that the residence lighting exhibit will be the sole exhibit of the Lighting Sales Bureau at the N. E. L. A. convention in Chicago, May 31-June 3. The Residence Lighting Division, under the chairmanship of M. Luckiesh, is preparing this exhibit. It will consist of a large composite room and several booths on the mezzanine floor at the Drake Hotel. The large demonstration room will be a duplicate in many respects of the demonstration room which Mr. Luckiesh has had in operation in the Laboratory of Applied Science, Nela Park, Cleveland, for several years, but additional features will be shown. The chief aim will be to demonstrate lighting effects and their possibilities, which is in line with the broader movement of considering lighting effects as the final result, rather than to consider fixtures in the usual narrow sense.

Many novelties will be introduced and special emphasis in the entire exhibit will be given to the demonstration of the charm and effectiveness of tinted lights. An individual booth is being constructed which will show the extensive possibilities of portable lamps in the home. Another booth will take up various features of residence lighting. The aim is not only to depict the present possibilities, but to prophesy the future of light in the home.

Wiring diagrams on a large scale will demonstrate adequately the wiring and lighting of residences. These diagrams are actual reproductions of the wiring which has been installed in various homes by those who are capable of presenting the subject to the householder in a manner which convinces him that light is a wonderful medium for making a house a home.

To summarize, it may be stated that the primary object of this exhibit will be to demonstrate that light is a medium superior to all others when cost is considered in making the house an interesting and desirable place in which to live.

JOBBERS ASSOCIATION TO DISCUSS CO-OPERATIVE METHODS.

Among the features arranged for the annual convention of the Electrical Supply Jobbers' Association to be held at The Homestead, Hot Springs, Va., May 25-27, are addresses by the following prominent men in the electrical industry: "Looking Forward," by W. L. Goodwin, assistant to the president of the Society for Electrical Development: "Co-operative Methods in Upbuilding the Industry," by M. H. Aylesworth, executive manager of the National Electric Light Association; "Co-operation," by Herman Plaut, president of L. Plaut & Co., New York City, representing the Illuminating Engineering Society; "The Straight Path," by Samuel A. Chase, Westinghouse Electric & Manufacturing Co.; "Does the Electrical Jobber Have Any Responsibility in the Safety Movement?" by Andrew MacLachlan, secretary of the Square D Co., Detroit, and "The Romance of Niagara's Electric Power," by George S. Anderson, publicity department of the Niagara Falls (N. Y.) Hydroelectric Development Co.

RADIO APPLIANCE SECTION, A. M. E. S., ORGANIZED.

Associated Manufacturers of Electrical Supplies Will Meet at New London, Conn., Next Month —New Section Elects Board of Governors.

The regular summer meeting of the Associated Manufacturers of Electrical Supplies, which the members are privileged to have their families attend, will be held at the Hotel Griswold, Eastern Point, New London, Conn., during the week beginning June 27, and plans are now being formulated to make it one of the largest and most successful in the history of the association. A special additional feature will be a gala luncheon to make up for the banquet omitted at the annual meeting.

On May 11 representatives of manufacturers of radio equipment and supplies for communication control, met at the Association headquarters and after organizing the Radio Appliance Section, elected D. R. Murdock, William J. Murdock Co., Chelsea, Mass., chairman; George J. Eltz, Jr., Manhattan Electrical Supply Co., New York City, secretary, and Charles Gilbert, De Forest Radio Telephone & Telegraph Co., New York City, treasurer. The sessions lasted throughout the day and most of the large companies were represented. Much enthusiasm was displayed and while no standing committees were formed, it was decided that the section should give an interesting demonstration of the mysteries of the wireless telephone, through direct communication with many inland cities and also with ships at sea, during the New London meeting.

The new board of governors consisting of S. H. Blake, General Electric Co., Schenectady, N. Y.; F. L. Bishop, Hartford Faience Co., Hartford, Conn.; Le Roy Clark, Safety Insulated Wire & Cable Co., New York City; A. H. Englund, Electric Service Supplies Co., Philadelphia; W. F. Field, Phillips Wire Co., Pawtucket, R. I.; J. J. Gibson, Westinghouse Electric & Manufacturing Co., Pittsburgh; H. D. Hawks, Anaconda Copper Mining Co., Chicago; A. F. Hills, Crouse-Hinds Co., Syracuse, N. Y.; Robert Kuhn, American Electric Heater Co., Detroit; Shiras

Morris, Hart & Hegeman Manufacturing Co., Hartford, Conn.; J. W. Perry, H. W. Johns-Manville Co., New York City; W. C. Robinson, National Metal Molding Co., Pittsburgh; Warren Ripple, Westinghouse Electric & Manufacturing Co., George Cutter Works, South Bend, Ind.; W. H. Thornley, Tubular Woven Fabric Co., Pawtucket, R. I., and J. H. Trumbull, Trumbull Electric Manufacturing Co., Plainville, Conn., held its first meeting at the Association headquarters on Friday, May 20.

PLANS FOR EXPANSION OUTLINED AT S. E. D. MEETING.

Society for Electrical Development Reviews Activities—Executive Committee Re-elected, With Charles L. Edgar as Chairman.

The Society for Electrical Development at its annual meeting last week elected the following directors: John F. Gilchrist, representing central stations; Anson W. Burchard, representing manufacturers; F. D. Van Winkle, representing jobbers; F. B. Adam, representing contractor-dealers, and Charles W. Price, representative at large.

In his report as general manager, J. M. Wakeman reviewed the activities of the Society for the past year, dwelling particularly upon the work done in supplying a weekly news service to the daily newspapers, special articles to popular magazines and the trade press. He also pointed out the great service rendered to the electrical industry by investigating the electrical fire reports appearing in the daily newspapers, having such reports corrected if found to be inaccurate, and the good work done in repudiating the statement made that electricity is the chief cause of fires in the United States. He called particular attention to the action of the Society in taking up the matter of the proposed Chicago ordinance and urged every electrical organization to vigorously oppose it, on the ground that such ordinances would prove a serious handicap to the development of the industry.

Speaking of the growth of the electrical page idea, Mr. Wakeman said that a recent questionnaire sent out by the Society to the newspapers using its weekly service showed that during the past 3 mo. the papers reporting had published 206,603 ins. of electrical advertising and 19,630 ins. of reading matter devoted to electrical subjects, in addition to which a large number of papers have used the suggestions sent out for editorial makeover, dealing with the necessity of electric service to the welfare and progress of the communities and the need for financing public utilities.

Attention was called to the completion of the revision of the electric range data, which showed the number of ranges on the circuits of the companies furnishing the data has doubled since the previous data sheet was compiled 2 yrs. ago; also to the third edition of Customers vs. Population, giving the total number of residence customers in each city reporting, the total meters on the line, the ratio figure between population served and residence customers, and, wherever the information was obtainable, the total number of appliances on the lines.

In closing his report Mr. Wakeman said: "All that has been accomplished by the Society is but the beginning of the work necessary to thoroughly inform the public on the achievements and problems of the electrical industry. The education of the public is the surest means of securing that good-will and co-operation so necessary to the success of the public utilities and without which their success would become unprofitable and a failure. The daily newspaper, popular magazine and trade journal work of the Society is rendering a steady, all the year round service to the industry in this important educational work."

Herman Plaut, speaking for the lighting fixture manufacturers, and L. L. Strauss, for the electric sign manufacturers, said that their branches of the industry will be glad to join and co-operate with the Society.

Mr. Goodwin outlined plans for expansion of the Society's activities. He exhibited a number of charts and explained their significance, outlining the possibilities of membership among the various groups in the industry. He suggested that the Executive Committee of each association be asked to vote their approval of the Society for Electrical Development. One way to tie-in the local leagues is to invite suggestions, criticisms and ideas as to how the tie-in could be effected. He pointed out that a serious situation confronts the industry in having non-electrical publishing companies making tests of appliances as well as electrical bodies, and said that the manufacturers naturally were opposed to this practice, although a great number of them are as yet ignorant of their operations.

Mr. Goodwin suggested that The Society for Electrical Development take up the study of this question and see what has been done and what can be done to establish the right kind of testing bureau for this work, and expressed the opinion that this should be one of the first things the Society takes up. He next outlined the necessity for trade surveys and showed how the Society should help the various groups in the industry in these studies, establishing a special department for trade surveys as quickly as possible with a permanent staff of competent investigators.

He talked about the necessity for a representative being appointed in Washington to work with the Government and the Chamber of Commerce of the United States, and stated that it should be the aim of the Society as soon as possible to hold an electrical congress at Association Island, or Hot Springs, or elsewhere to blaze the trail of future progress. The industry would welcome the leadership of such a group of men. He also dwelt upon the idea of making the insignia or trademark of the Society stand for something in the mind of the public; it should mean so much that no one can afford to be in the industry and not have the privilege of using it.

Mr. Goodwin also stated that membership in the Society should mean more than merely signing an application and paying dues. There should be an obligation the applicant must sign. He said that if interest in the Society is to be maintained members must do something more than pay dues. They should be called upon to render service of some kind. They should be asked to help in planning campaigns, etc., and advisory committees should be established at once. The staff of the society should be further strengthened and built up by engaging first-class men from each interest

in the industry. He expressed the belief that one of the Society's greatest opportunities is to develop a department to help the utilities in marketing their securities by supplying security salesmen with authentic information which would be useful in their work. Such a department would eventually develop a thrift department through which investments in securities could be made.

At the meeting of the board of directors held at the close of the annual meeting of the Society, the following officers were elected for the ensuing year: President, W. W. Freeman; vice-presidents, Fred Bissell, J. Robert Crouse, A. W. Burchard and J. R. Strong. The following were elected to serve upon the Executive Committee: Charles L. Edgar, chairman; J. E. Montague, L. P. Sawyer, W. D. Steele, E. W. Rockafellow, Fred Bissell, J. R. Strong, F. B. Adam and J. R. Crouse, with President Freeman as a member ex-officio.

ELECTRIC SHOW WILL BE STAGED DURING CONVENTION.

Commonwealth Edison Co. Plans to Hold Electric Automobile and Advertising Exhibit as a Feature of N. E. L. A. Meeting.

Several unusual displays prepared and produced by the Commonwealth Edison Co. will feature the convention of the National Electric Light Association, to be held in Chicago, May 31-June 3. These Edison contributions (in addition to the General Convention Committee, headed by E. W. Lloyd) include an electric automobile show, an electric show and an advertising exhibit.

The electric automobile exhibit will be the first event of its kind ever held anywhere, because it will be a show devoted exclusively to the exhibition of electric passenger autos, trucks, tractors and their accessories. This first electric automobile show will be held in the Edison building, in the appliance room of the Electric Shop. In conjunction with the show, a sort of an electric show will be put on at the same time and at the same place. This show will consist of an exhibition of practically everything electrical and a demonstration of nearly every kind of appliance.

An advertising exhibit is also being prepared which will display specimens of advertising matter sponsored by every member-company of the National Electric Light Association. Booklets, broadsides, folders, posters and special campaign matter will be shown, thus giving everybody an idea of the vast amount of publicity that is used to keep the public informed of the latest and best the industry affords.

DISCUSS CONTRACTOR-DEALER AS A RETAIL DISTRIBUTOR.

Westinghouse Agent-Jobbers' Association Hold Ninth Meeting at Hot Springs, Va.—Prominent Speakers Address Convention.

The ninth meeting of the Westinghouse Agent-Jobbers Association at The Homestead, Hot Springs, Va., May 17-21, was featured by many instructive talks, among which was one by W. L. Goodwin, assistant to the president of the Society for Electrical Development, on "Our Common Interest in the Electrical Industry and How We Can Capitalize It."

Tuesday's sessions were taken up by routine business and the various committee reports, following which Walter Cary, vice-president of the Westinghouse Electric & Manufacturing Co. and the Westinghouse Lamp Co., gave an address on "Our Common Interests." J. C. Schmidtbauer, chairman, submitted a report of the Special Committee on Apparatus Sold to Public Utilities, and A. J. Cole, chairman of the Committee on Apparatus and Material Sold to Rural Customers, submitted his report.

The following committee reports were submitted on Wednesday: Report of Committee on Merchandising by N. G. Harvey, chairman; report of subcommittee of Merchandising Committee on Heating Appliances, by J. C. Schmidtbauer, chairman; report of subcommittee of Merchandising Committee on Fan Motors, by F. D. Phillips, chairman; report of subcommittee of Merchandising Committee on Local Newspaper Advertising, by G. S. Milner, chairman.

The morning session of Thursday, May 19, was devoted to committee reports as follows: Report of Committee on Devices Sold to Contractors, by F. D. Phillips, chairman; report of Committee on Apparatus Sold to Industrials, by C. S. Walker, chairman, and report of Special Committee on Service, by Charles Robbins, chairman. In the evening M. C. Rypinski gave a radio apparatus demonstration of the wireless telephone, and the Free-Westinghouse sewing machine was discussed by V. M. Johnson, general manager of the Free Sewing Machine Co., Rockford, Ill.

On Friday, May 20, the following addresses were listened to with interest: "The Merchandising Tree," by F. M. Feiker; "Good-Will in the Electrical Business," by Charles W. Price; "The Contractor-Dealer as a Retail Distributor," by James R. Strong, New York City, chairman of the National Association of Electrical Contractors and Dealers; "Retail Outlets for Electrical Materials," by O. P. Hudson, and "The Responsibilities of the Jobbers' Salesmen," by Howard Ehrlich.

ELECTRIC SIGN SHOW PROVES BIG SUCCESS.

The electric sign exhibit held recently in the Irving place showroom of The New York Edison Co. proved highly successful in every way. It far exceeded the expectations of those who planned it, not only in the scope of the displays but in the attendance and in the new business that the exhibitors secured. The showroom was given over to the sign-makers and the displays included flashers, lamps of every type, color caps, flashing signs in actual operation, counter advertising novelties, stereopticans and slides, moving-picture machines and exhibits by the sign maintenance companies. Of considerable historic interest were the photographic displays of the earliest electric signs. These photographs were lent by Major W. J. Hammer, who in 1881 made the first electric sign.

A number of actual sales were closed during the show, manufacturers reporting business totaling over $15,000. One of the buyers was a merchant from South America. The list of pros-

pects as a result of this exhibit is very large and indicates a great interest in electric advertising. The next Edison exhibit will be that devoted to electric heat during the week of June 6, which will be followed on June 20 by the electric ventilating show.

I. E. S. DISCUSSES FUNDAMENTALS OF LIGHT CONTROL.

"Fundamentals of Light Control" was the subject discussed by Earl A. Anderson, National Lamp Works of General Electric Co., at the open meeting of the Cleveland Chapter, Illuminating Engineering Society, May 12. By the use of many well-arranged experiments and exhibits the speaker described and illustrated the fundamental principles upon which the modern systems of light control embodied in reflectors, refractors, etc., are based. His talk was followed by an interesting discussion. The audience, which included representatives from many diversified interests, numbered about 50.

This was the third of a series of talks which have been arranged by the Cleveland Chapter. They have been planned with a view to interesting persons in many lines of work. All have been well attended, and it is believed that plans which are now under consideration for further meetings will materially add to the support which the Chapter is receiving in Cleveland.

EXTENSIVE PROJECT PLANNED IN NEVADA AND ARIZONA.

According to advices from Washington, D. C., the highest dam in the world, to join the states of Nevada and Arizona, and harness the turbulent waters of the Colorado river for extended irrigation in the Southwest, is to be constructed in the near future by the U. S. Reclamation Service. The dam, according to tentative plans, would rise to the unprecedented height of 500 or 600 ft. in Boulder canyon, where granite abutments rise more than 1000 ft. above the water surface.

Engineers of the Reclamation Service, afloat on barges, are boring for bedrock beneath. A lake varying from 30 to 50 mi. in length would be backed up in the Colorado and Virgin rivers, and in this basin would be held in check for irrigation the drainage from almost the entire Colorado basin, including parts of six states.

GENERAL ELECTRIC CO. BOOKINGS MAINTAIN AVERAGE RATE.

At the annual meeting of the stockholders of the General Electric Co. authority was given to increase the capital stock from $175,000,000 to $185,000,000, and an amendment to the by-laws was passed increasing the number of directors from 14 to 15. Bookings of the company are still maintaining a rate equal to about 60% of plant capacity. This is approximately the average rate of incoming orders since the first of the year. There has been no appreciable change within the last month.

Billings are still considerably above bookings, but are being shaded off gradually as long as there is no improvement of buying in sight. At the end of last year the company had $111,000,000 unfilled orders on its books. It is necessary to keep from $50,000,000 to $60,000,000 unfilled orders at all times. There was thus a margin of slightly over $50,000,000 at the beginning of the year against which the company could operate over its bookings rate. A considerable part of this margin has been worked off. Production will probably continue to be diminished gradually until the rate of bookings picks up, as capacity operation would exhaust the margin of unfinished orders before many more months have elapsed.

A. S. M. E. ADDS TWO NAMES TO ITS HONORARY ROLLS.

The American Society of Mechanical Engineers has announced the election to honorary membership of Henry R. Towne, head of the Yale & Towne Manufacturing Co., and Nathaniel Greene Herreshoff, naval architect and yacht designer. The honor, which recognizes distinctive achievement in engineering and scientific endeavor, will be formally conferred at the next annual meeting of the Society in New York City. Eight honorary members have been elected during the past year, the others being Lord William Weir, Glasgow, Scotland; Sir Charles Algernon Parsons, London, England; Commandatore Pio Perrone, Genoa, Italy; Rear Admiral R. S. Griffin, U. S. N.; Captain Robert W. Hunt, Chicago, and Samuel M. Vauclain, Philadelphia.

The honorary rolls of the Society, which has a membership of 15,000 with branches in practically every state, have carried the names of many men of worldwide fame. Among them have been Peter Cooper, Henri Schneider, Henry Tresca, Henry Bessemer, George Westinghouse, Rudolph Diesel, John Fritz, George W. Melville, Francis A. Walker, Frederick Bramwell, Andrew Carnegie, and John A. Brashear. Thomas A. Edison is among the living honorary members.

CIVIL SERVICE EXAMINATION FOR SIGNAL ENGINEER.

The U. S. Civil Service Commission has announced an open competitive examination for senior signal engineer, grade 1, applications to close June 7. Applicants will be required to show that they have graduated with a degree from the mechanical or electrical engineering course of a college, university or technical school of recognized standard, and, in addition, have had at least 5 yrs. actual, responsible, practical experience in railway signaling work subsequent to graduation; or, in lieu of each year lacking of such complete 4 yrs. college course, applicants may submit not less than 15 mo. actual, responsible, practical experience in railway signaling work. Those desiring to make application should write to the Commission, Washington, D. C., asking for form 1312 and mentioning the title of the examination desired.

ELECTRIC HEATING DEVICES TO BE DISPLAYED.

Two exhibits of industrial importance are to be held in the Irving place showroom of The New York Edison Co. in June. The first will be devoted to electric heating and will be given during the week of June 6-11. For the week beginning

June 20, a demonstration of electrically operated ventilating equipment is scheduled. Plans for the heating show are well advanced, and practically all of the electrical appliances for industrial and domestic heating which have been perfected during the past 5 or 10 yrs. will be exhibited. Forty-one manufacturers have accepted the Edison company's invitation to take part and at least 100 different applications of electric heat will be shown. Cartridge units, tubular heaters, soldering irons, capping tools and branding irons, apparatus for candy makers and for use in shoe factories, printing plants and other industries will be exhibited and demonstrated. Among the domestic applications of electric heat will be ovens and ranges and other cooking equipment, laundry apparatus, and heating appliances for bedrooms or bathrooms.

The ventilating display will include air-conditioning equipment such as humidifiers and apparatus for temperature control and various types of fans for home, office, and factory. The importance of ventilation and temperature control is now recognized as having an important bearing on production, and is receiving careful study by industrial managers. A conference of industrial and ventilating engineers will probably be held during the week.

YALE ADDS UTILITY REGULATION COURSE.

A course dealing with the regulation of public utilities, and conducted by members whose actual work gives them a first-hand knowledge of the problems involved, is the latest addition to the curriculum of the Yale School of Law. The purpose is to give the student the benefit of broad, practical experience in a field of importance, where at present there is a lack of specially trained lawyers.

OFFICERS OF NEW JERSEY BOARD.

The recently appointed Board of Public Utility Commissioners, Trenton, N. J., has re-elected L. Edward Herrmann, Jersey City, as general counsel, and Alfred N. Barber, Trenton, as secretary to the commission. Mr. Herrmann was counsel to the former commission for a number of years, and Mr. Barber has been secretary since the creation of the board in the state.

PETITION FOR LOWER RATES.

Mayor Peters of Boston has filed a petition with the Department of Public Utilities on behalf of the city, asking for lower rates for electric service than those now charged by the Edison Electric Illuminating Co. The prevailing rate is $0.105 per kw-hr., having been reduced to this figure from $0.11 in June of last year.

ASSESSMENTS FOR STREET LAMPS.

The State Legislature of Pennsylvania is considering a bill, introduced by Senator Service, Mercer county, authorizing third-class cities in the state to assess the cost of ornamental street lamps, standards or other fixtures upon property owners abutting upon the highway to be so improved.

COMING CONVENTIONS.

American Society of Mechanical Engineers. Spring meeting, Chicago, May 23-26. Headquarters, Congress Hotel. Assistant secretary, C. E. Davies, 29 West 39th street, New York City.

International Railway Fuel Association. Annual convention, Chicago, May 24-26. Headquarters, Hotel Sherman. Secretary, J. G. Crawford, 702 East 51st street, Chicago.

Stoker Manufacturers Association. Annual meeting, Stockbridge, Mass., May 24-26. Headquarters, Red Lion Inn. Chairman of Publicity Committee, R. C. Beadle, 11 Broadway, New York City.

Electrical Supply Jobbers' Association. Thirteenth annual meeting, Hot Springs, Va., May 25-27. Headquarters, The Homestead. General secretary, Franklin Overbagh, 411 South Clinton street, Chicago.

Pacific Coast Geographic Division of the National Electric Light Association. Annual convention, Del Monte, Cal., May 25-27. Headquarters, Hotel Del Monte. Secretary, L. H. Newbert, 445 Sutter street, San Francisco.

National Electrical Light Association. Annual convention, Chicago, May 31-June 3. Headquarters, Drake Hotel. Executive manager, M. H. Aylesworth, 29 West 39th street, New York City.

New York State Association, National Association of Stationary Engineers. Annual convention, New York City, June 9-11. Headquarters, Hotel McAlpin, 34th street and Broadway. Secretary, E. Davies, 1379 St. Johns place, Brooklyn, N. Y.

National Fire Protection Association. Annual convention, San Francisco, June 14-16. Secretary, Franklin H. Wentworth, 87 Milk street, Boston.

Tri-State Water and Light Association. Annual convention, Asheville, N. C., June 15-16. Secretary, W. F. Steiglitz, Columbia, S. C.

Northwest Power and Light Association. Annual convention, Portland, Ore., June 15-17.

Canadian Electrical Association. Annual convention, Quebec City, June 15-17. Secretary, Eugene Vinet, Power building, Montreal, Que.

American Society for Testing Materials. Annual convention, Asbury Park, N. J., June 20-24. Headquarters, New Monterey Hotel. Secretary, C. L. Warwick, 1315 Spruce street, Philadelphia.

American Institute of Electrical Engineers. Annual convention jointly with the Pacific Coast convention, Salt Lake City, Utah, June 20-25. Secretary, F. L. Hutchinson, 33 West 39th street, New York City.

North Central Geographic Division of the National Electric Light Association. Next convention, Duluth, Minn., June 21-23. Headquarters, Spaulding Hotel. Secretary, H. E. Young, 15 South Fifth street, Minneapolis, Minn.

Associated Manufacturers of Electrical Supplies. Summer meeting, Eastern Point, New London, Conn., June 27-July 2. General secretary, Charles E. Dustin, 30 East 42d street, New York City.

Wisconsin State Association of Electrical Contractors and Dealers. Summer outing and business meeting, Waupaca, Wis., July 9-11. Secretary, H. M. Northrup, 23 Erie street, Milwaukee.

Ohio Electric Light Association. Annual convention, Cedar Point, O., July 12-15. Headquarters, Breaker's Hotel. Secretary, D. L. Gaskill, Greenville, O.

National Association of Electrical Contractors and Dealers. Anniversary convention, Buffalo, N. Y., July 18-23. Headquarters, Lafayette Hotel. Secretary, W. H. Morton, 110 West 40th street, New York City.

Pennsylvania State Association of Electrical Contractors and Dealers. Semi-annual meeting, Buffalo, N. Y., July 19. Headquarters, Lafayette Hotel. Secretary, M. G. Sellers, 1518 Sansom street, Philadelphia.

Illuminating Engineering Society. Annual convention, Rochester, N. Y., Sept. 26-30. General secretary, Clarence L. Law, 29 West 39th street, New York City.

New York Electrical Show, 71st Regiment Armory, Park avenue and 34th street, New York City, Sept. 28-Oct. 8. General manager, George F. Parker, 124 West 42d street, New York City.

ELECTRICAL COMMUNICATION

Items of Interest in Connection with Present Practice and Progress in the Science and Art of Transmission of Intelligence by Electrical Means

A TRIUMPH FOR THE TELEPHONE IN VOICE AMPLIFICATION.

Equipment Used to Multiply Voice of the President Proves Great Success and Pleases Audience at Recent Inauguration.

With the aid of the telephone Loud-Speaker, installed at Washington by the engineers of the American Telephone & Telegraph Co., President Harding addressed the greatest number of people that has ever listened to one man's voice in the history of the world. These engineers, in the confidence that they had previously substantiated, promised that everyone at the Capitol front should hear the address of the President-Elect. The promise was kept. In that deeply impressed crowd of over 100,000 everyone heard the inaugural address of March 4, 1921, clearly and distinctly.

The President began the reading of his address, and immediately it was apparent that he was being heard everywhere. In other years

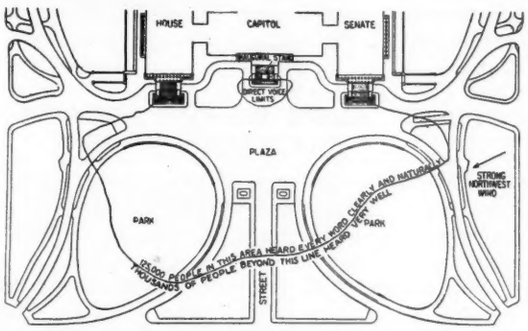


Diagram Showing Limits of Direct and Amplified Voice of the President.

those fortunate enough to get within 100 ft. of the inaugural stand could hear the speaker; others merely saw him. But this time everyone heard and understood.

The reproduction of the President's voice by the new device was so perfect that those in the first rows could not tell where the natural voice left off and where the amplified voice began. If one could have walked away in a straight line from the platform he could have detected no change in tone and but small variation in the volume. In the distance the sound was as clear as in the first row. It was indeed a perfect demonstration of the new art of voice amplification.

When President Harding had departed the doors of the control room were opened and people were permitted to pass through to view the intricate equipment used to carry the President's voice. Ushers from the Chesapeake & Potomac Telephone Co. were present and explanatory signs were placed on the various pieces of apparatus. Hundreds of people entered and viewed with great interest this electrical development which one telephone enthusiast said "marks the renaissance of American oratory."

Description of Device Used for Amplification of Voice.

The plant consisted of a system of motors, generators, wires, transmitters, amplifiers and other electrical equipment weighing several tons and filling three rooms. And it was most delicate machinery, requiring the utmost care in its operation. A drop of water or a piece of metal the size of the head of a pin would have put the whole plant out of business.

None of the apparatus or machinery was in evidence on the stand. The speaker himself saw nothing of it except the small transmitter box that stood just in front of his desk, and even these could not be seen by the audience.

These were not ordinary transmitters, but remarkably delicate and sensitive instruments adjusted to an infinite degree, carefully shielded with copper, which, grounded, carried off any tiny current that might interfere, and these ultra-sensitive transmitters caught every variation of the voice with fidelity.

The transmitters picked up a minute part of the energy created by the President's voice. This was carried by wires from the transmitters to the intricate apparatus in the control room and stepped up through eight successive stages of amplification. In each stage the energy was led into a glass bulb, called a vacuum-tube amplifier, the function of which was to receive the energy, amplify it and send it on to the next amplifier in line until it had been amplified billions of times and became strong enough to go out in voice form through the horns in the top of the stand. The tones which left the horns followed the tones of Mr. Harding's voice with exact fidelity, but with a force of many voices.

Provisions were made for the possible breaking down of the apparatus. Every piece of equipment was in duplicate—two of everything but the group of horns. Throughout the address men stood at the apparatus, their hands on the switches, ready to throw the current into the emergency equipment if necessary.

But the need did not arise.

Equipment Used to Be Placed in Museum as a Tribute to Success.

The transmitter, together with the amplifying tubes and certain other portions of the apparatus, will have a place in the museum of the American Telephone & Telegraph Co. to be shown future generations as the equipment that carried the inaugural address of President Warren G. Harding.

Much testing of the equipment was necessary, and this phase of the job was done in the days

and nights immediately preceding the inauguration. In the human voice there is a range of tones from several hundred vibrations per second to several thousand, and the system had to be tested out with a series of tones at intervals over the whole range.

Each horn was a separate problem; each horn had to be adjusted according to the space in front of it so that the voice, coming out of the several horns, would be uniform. Men were stationed on the plaza at different points to catch these sounds and check them up with the men in the control room by means of telephone circuits. This work required the utmost co-operation and co-ordination.

The apparatus was used without expense to the Government, a gift from the American Telephone & Telegraph Co. through its associated company, The Chesapeake & Potomac Telephone Co. President A. E. Berry of the latter company received a cordial letter of thanks and appreciation from Senator Philander C. Knox, chairman of the joint congressional inaugural committee. A dinner was enjoyed by the telephone staff at the Columbia Country Club on the night of the inauguration, and felicitous speeches were made by E. K. Hall, vice-president of the American Telephone & Telegraph Co., Mr. Berry and G. K. Thompson, personal representative of Col. John J. Carty, vice-president of the American Telephone & Telegraph Co., in charge of development and research.

NEW SPEED RECORD MADE IN RADIO TRANSMISSION.

A new world's record for speed reception of the Continental Morse Code was set on March 18, 1921, at the first annual convention of the second district Radio Council, which was held over a period of four days at the Pennsylvania Hotel, New York.

This contest was open to the world, and experts from the Navy, Radio Corp. of America, and cable men from the Western Union Telegraph Co. participated. In all, the contestants numbered about 60. About two-thirds of the contestants dropped out when the speed reached 35 words a minute. At 42 words there were 8 left, and at 45 only two—B. F. Seutter of the Times Radio Station, and N. Bernstein, of the Western Union Telegraph Co., New York City. So close and so well matched were these two that three separate runs were necessary before the judges declared Mr. Seutter winner. Mr. Seutter had two errors and Mr. Bernstein had three. The result was in doubt until the end. The record set by these two contestants was 48.6 words per minute. The former record was held by Tony Gearhart of San Francisco, who attained a speed of 47 words per minute with 3 errors. Mr. Seutter received a cup as a prize.

WIRELESS SIGNALS USED TO SET SYSTEM OF CLOCKS.

After long experiment there has been constructed at Plainfield, N. J., a clock designed to be automatic in its operations and corrected daily by the radio impulses sent out from Washington. Up to the present time the correction of timepieces has depended upon wire circuits in which the clocks to be corrected were connected, or upon the use of head phones and stop watches and the human element.

T. S. Casner and O. L. Badger, of Plainfield, developed the clock. It is self-winding and is automatically synchronized with the Washington observatory time each day at noon. Besides indicating time, the clock is arranged to operate and control any number of secondary clocks, and a correction in time on this master clock corrects the entire line of secondary clocks which it controls.

INTERESTING FEATURES OF A NEW TELEGRAPH PLANT.

The new Chicago Western Union Telegraph Co's. office, which is the largest in the United States, has among its equipment in the operating room 141 duplex sets, 54 quadruple sets, 19 universal duplex repeaters, 21 half repeaters, 28 single-line repeaters, 18 duplex half repeaters, 2 rotary repeaters and 2 metallic repeaters. The most generally used repeater for high speed work is that known as the Universal repeater. A new type of repeater known as the Rotary repeater is used on important multiplex printer circuits. It not only serves to repeat the impulses accurately, as is done by the Universal repeater, but actually serves to correct, within limits, imperfect signals received when they are retransmitted. Metallic repeaters are used on metallic or underground circuits. Metallic circuits are favored as a means for securing transmission totally immune from extraneous disturbances such as the Aurora Borealis.

COLLEGE NEWS TO BE EXCHANGED BY RADIO.

Plans for the exchange of college news by radio were made at the intercollegiate conference on undergraduate government, meeting at the Massachusetts Institute of Technology.

A wide range of subjects was discussed during the 2-days' conference, the delegates being divided into four sections to facilitate the work.

The adoption of radio communication should prove of interest and value to the students of the various institutions where equipment will be installed.

RADIO DEVICE TO GUIDE SHIPS SAFELY THROUGH FOG.

A wireless invention by which ships may be guided during dense fogs has been recently announced. The invention is based on a principle by which electric waves may be directed in any definite direction like flashes from a lighthouse. These waves would take the place of leading lights in thick weather, and would prevent collisions of vessels during fogs.

RADIO CORP. ELECTS OFFICERS.

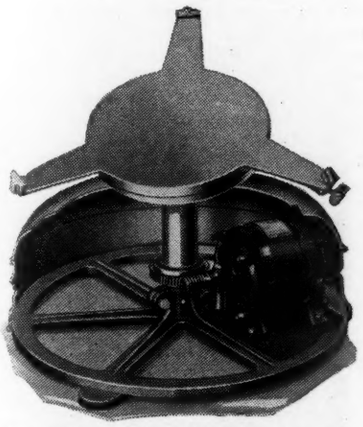
Owen D. Young has been elected chairman of the board of directors of the Radio Corp. of America, 233 Broadway, New York City. Edward J. Nally has been elected president; John W. Elwood, secretary, and George S. De Sousa, treasurer. John W. Griggs has been appointed general counsel.

APPLIANCES and DEVELOPMENTS

New, Improved or Interesting Electrical and Mechanical Apparatus and Devices, and Applications of Equipment and Methods in Practice

Construction Features of "Little Giant" Washer.

The "Little Giant" washing machine, recently placed on the market, is simple in design and construction. The body is made of 18 oz. sheet copper, tinned inside and having three vertical ribs which deflect movement of the water. It is flat bottomed with



Base Plate With Driving Mechanism Exposed.

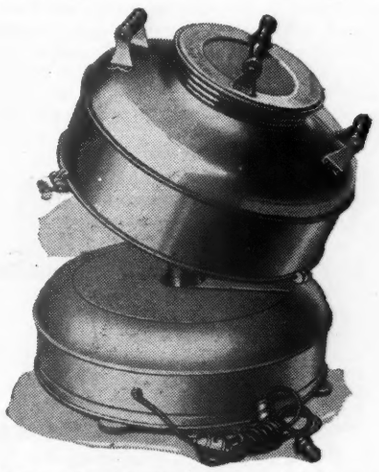
neatly rounded top in the center of which is a 9-in. opening. This opening is tightly sealed by an all-copper, screw cap with non-leak vent. The handles on body and cap are of wood and are secured by all-brass ears or lugs riveted to the respective members. This is attached to the operating base plate by a 3-arm spider made of aluminum. On one of the arms at its outer extremity is a hook-shaped clamp. By loosening or tightening a single thumb-screw, the body is removed or securely replaced.

The base plate is made of aluminum and the weight of the body and contents is carried on a 9-in. ball bearing with 86 5/16-in. steel balls. This bearing is of unique design. It can be removed bodily from its seat in the revolving element and disassembled without the use of tools. As its normal position is at an angle of about 40 deg. to the vertical shaft, its removal so that it may be laid flat is very essential if repairs are at any time necessary. The shaft or central member, which is stationary, is attached to the center of the aluminum base plate by a universal joint. This shaft is of solid cold-rolled steel, 1.5 in. diam., and at its lower end screws into the castiron pedestal and after being adjusted is then pinned in a permanent position.

The outer, or revolving member, is a strong castiron cylinder 1-9/16 in. internal diameter having a flat plate at its upper end, cast integral with it. The face of this plate is at an angle of about 40 deg. to the vertical and carries the 9-in. ball bearing upon which the aluminum spider rides. At the lower end of this outer member is a flange to which the worm driving gear is securely fastened with a hardened steel thrust collar beneath it. Between this thrust collar and the pedestal is a ball thrust bearing.

The driving of the machine is done by a 0.1-hp. a-c. or d-c. motor, mounted upon the base of the mechanism being inclosed by an enameled sheet-metal cover. The end of the motor shaft carries the worm pinion. The gear reduction is about 30 to 1, which operates the machine at from 60 to 70 r. p. m. according to voltage conditions.

The action of the machine is difficult to describe. The body being held in a fixed relation to the shaft, when the revolving member, with its tilted top plate, is moved the body takes on a motion which constantly changes the tilt of the body without revolving it. As a result, the washing water is forced through the clothes in every direction and the clothes are efficiently washed in a surprisingly short time. As the interior of the washer is perfectly smooth, the machine is especially desirable for washing lin-



"Little Giant" Washer Completely Assembled.

gerie and wearing apparel of any kind made from sheer, delicate materials. The capacity of the machine is equivalent to five sheets. The body is also used as a boiler, the same being put directly on to the gas stove with its contents and after boiling it is placed on the machine and the washing process follows. It is manufactured by the Little Giant Washing Machine Co., 126 North Union street, Chicago, and will be on exhibit at the forthcoming Pageant of Progress Exposition to be held in Chicago, July 30-August 14.

This Washing Done in One Operation in the "Little Giant" Washer Clearly Indicates the Capacity.

Making Screws Hold in Any Kind of Material.

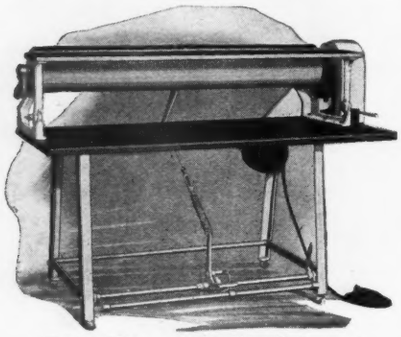
Contractors, builders, electricians, engineers, plumbers, carpenters and decorators will be interested to learn that the Rawlplug Co., 461 Eighth avenue, New York City, has developed a device known as "Rawlplug" by which the ordinary screw can be made to hold securely in any material —brick, concrete, soft stone, cement, plaster, lath, marble, slate, glass, iron, steel and any metal. The device consists of a tube of fibre which has been stiffened in the manufacturing and which automatically expands when a screw is driven into it and obtains a firm hold. The hole is previously drilled in the material by the Rawlplug tool and a satisfactory thread is formed when the screw is turned home.

This method is particularly valuable for fastening switchboards, cables,

conduits, partitions, meters signs and bathroom fixtures, and also in the home for fastening shelves, cupboards, coat hooks and hanging pictures and mirrors. No special screws are required since the plugs are made in regular screw sizes and moisture tends to expand the fibres and strengthen the plug's hold. Tests carried out under working conditions show that by direct pull it required an average force ranging from 40 to 1250 lbs. to loosen screws held by Rawlplugs, depending upon the kind of materials, length and size of screws.

"Cottage" Ironer with Many Desirable Features.

That there is a large market for electrical appliances in which are combined substantial construction, correct principles of design and low price, is a fact which is being recognized generally by the electrical trade. The "Cottage" ironer, recently placed upon the



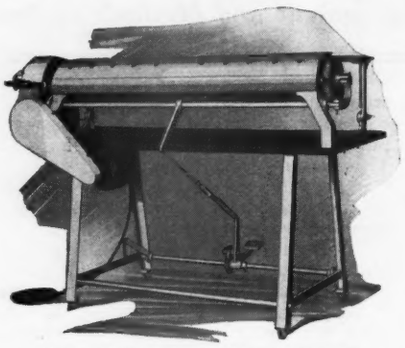
Front View of "Cottage" Ironer.

market by the William G. Yates Co. of Cleveland, was designed and is being offered as a fast-selling, popular-priced appliance. As the illustrations reveal, it is extremely simple in design, yet according to the manufacturer it not only embodies every desirable feature found in many larger, heavier and more expensive machines but has a number of exclusive advantages of its own.

The "Cottage" ironer is, it is claimed, as substantial and sturdy as a small family ironer needs to be. Though weighing but 142 lbs., it has a 46-in. roll, ample power, and sufficient pressure to accomplish any ironing likely to be attempted in the course of ordinary household use. Weight has not been sacrificed at any point where strain occurs, nor, say the makers, has any detail been slighted which is needful or desirable for practical service.

The particular and exclusive merits claimed by the Yates company for this appliance include an open end roll over which skirts and ruffles of any width can be ironed; a lift of 4.5 ins. between roll and ironing shoe, which not only facilitates cleaning and waxing of the shoe, but enables the operator to press skirts, trousers and other heavy goods in a manner very similar to that of the tailors' pressing machines; and a pad of such resiliency and absorption quality, that the machine will satisfactorily take care of a "rainy-day ironing" when clothes cannot be completely dried out of doors but come to the ironer unusually damp.

Extensive field tests have preceded the placing of the "Cottage" ironer upon the market. William G. Yates, head of the company which is making and marketing the device, has had long experience in the electrical job-



Back View of "Cottage" Ironer.

bing and manufacturing fields, and fully realizes the danger of offering for sale any household appliance from which the "bugs" have not been entirely eliminated. Therefore this ironer has been subjected to the most rigid tests, has been given long, hard usage in a number of hand laundries as well as homes, and is claimed to have stood up under abuse and mishandling in a manner not only gratifying but actually surprising to those interested.

The specifications of the "Cottage" ironer are as follows: Floor space, 21.5 by 54 ins.; weight, 142 lbs.; power, 1/6 hp.; width of roll, 46 by 6.5 ins.; speed of roll, 8 ft. per min., and lift of shoe from roll, 4.5 ins.

Copper Tub Washer Added to Woodrow Machines.

The Woodrow Manufacturing Co., Newton, Ia., manufacturer of the disk and dolly type washers, has recently

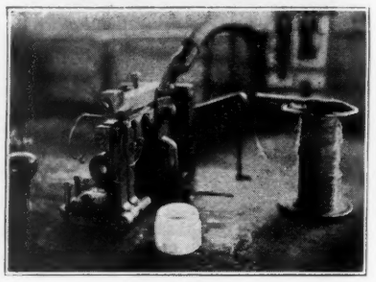
New Model of Washer Made by Woodrow Manufacturing Co.

added to its line a copper tub machine, illustrated herewith, which is made of extra heavy copper, the lids being made of cast aluminum. The wringer, which has 12-in. rolls and swings to four positions, is equipped with aluminum hand rests and aluminum reversible water board.

The manufacturer states that the new models, excepting for the tub and wringer equipment, are identical with the other Woodrow machines manufactured by the company. The frame is made of galvanized angle steel and the tub tilts for quick and easy draining.

Modern Method of Soldering by Electrical Machine.

Electricity has been used for heating metals for many years, but it was not used extensively for welding or similar purposes until after about 1888 when alternating current became available for welding purposes. In soldering as in welding, a high value of current at a low voltage is used to bring the articles to the desired heat, and on account of the use of this low voltage on the working parts of the machine there is little danger of the operator being injured from shock. Since an alternating current of high voltage and low current value can



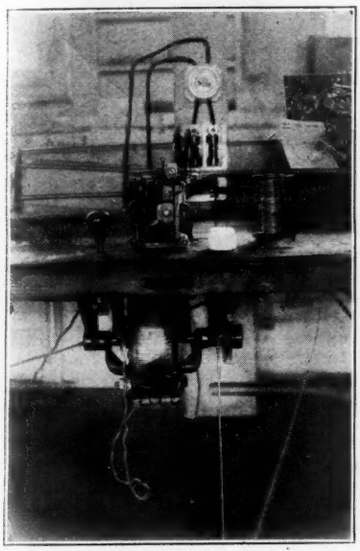
Upper Portion of Costello Electric Soldering Machine.

easily be converted to one of low voltage and high current value by means of a transformer, the way was opened to many new and practical uses of the electric current, prominent among which was the uniting of metals either by welding or soldering.

In welding the parts to be united are heated until the temperature is just below the melting point and then forced together by pressure while the

metals are in a plastic state. In soldering the parts to be joined are simply heated just enough to melt the solder. Obviously there are a great many articles manufactured that are of such construction and material that it is not practical to weld the parts to be united, and therefore electric soldering solves the problem.

The Costello electric soldering machine, developed by F. A. Costello, Martin-Copeland Co., Providence, R. I., is an excellent apparatus for such work since it is especialy adapted to hold such parts while a current of sufficient strength is passed through them to flow the solder necessary to unite them. This machine is the result of over 10 yrs. experimental and development work and some of the first machines produced have been in con-



Costello Electric Soldering Machine with Transformer Below.

tinuous commercial service for more than 8 yrs.

They are equipped with a transformer, especially built for the purpose of electric soldering, which has a wide range of heating capacity that may be varied in steps of less than 0.01 volt in the heating circuit by turning a lever which changes the position of the moving core. Thus the voltage and amperage are regulated to give exactly the required heat for the soldering work. No current consuming devices such as reactance coils or rheostats are used to adjust or vary the current flowing in the heating circuit.

It will be noted from the illustration that the current carrying leads are separately attached to the upper and lower jaws of the machine, thereby completing the circuit when these jaws are brought together or in contact with the same piece of metal. The work-holding clamps are operated by a foot-lever thus leaving both hands free to feed the parts to be soldered into position and these metal parts complete the electric circuit. Mounted on the table board at the left is a simple, easily operated hand switch which controls the current that energizes the transformer.

As an example of the gain in production and reduction in cost that may be obtained with the use of this machine, the following can be cited. The cost of soldering a certain article by gas was $0.075 per 100 pieces and one operator would produce 3600 pieces per day of 9 hrs. The same article was soldered by the Costello electric soldering machine at a cost of $0.025 per 100 pieces and one operator produced 10,400 pieces per day of 9 hrs. and work of better quality.

This is not an exceptional instance either, since records kept upon 26 different articles show the average saving of the electric method over gas to be at least 57% without taking into consideration the fuel saving. The amount of energy consumed in the machine is so small that it may be disregarded as a factor in the cost of soldering.

The machines are built for use on alternating current with a voltage of from 80 to 250 volts. Any electrician can readily set up the equipment by following the instructions provided, and with each outfit to be used for silver or gold soldering a formula for soldering flux that is easily made and has many advantages over the old borax and stone method is included.

In many cases these machines will eliminate mechanical operations such as setting up, peening and piercing, since the parts may be put together and held in their correct relative positions ready for soldering right in the machine itself. At present the Costello electric soldering machine is successfully used in soldering the following articles: Optical parts, jewelry, rings, typewriter parts, fountain pen parts, pencil parts, fuses and switch plates. One large factory in New England has in use over 100 of these machines.

The advantages of electric soldering over the old hand and gas methods may be summarized thus: (1) Increased production per operator; (2) better quality of work results because heat is confined to the joint. Also articles that could not be soldered by gas can be handled; (3) cost of production decreased because skilled labor is not required; (4) better working conditions with no open gas flame to consume oxygen and heat up the atmosphere; (5) no danger of fire from open gas flames or leaky gas pipes, and (6) practical for annealing purposes when it is necessary to anneal an article for a certain portion of it and still maintain the temper in the balance of it.

Installation of 13 Costello Electric Soldering Machines Doing Five Different Kinds of Work.

Fan Designed for Use in Closed Cars and Ambulances.

The Knapp Electric & Novelty Co., 511 West 51st street, New York City,

Knapp "Limo-Sedan" Fan.

manufacturer of battery motors, electrical toys and specialties, has placed on the market its new "Limo-Sedan" fan No. 175-D, for use in closed cars, ambulances or small cabin boats, etc. The main features of the fan are thus set forth by the maker:

The battery wires are 6 in. long, the bracket has a double joint with rigid set pins and several points of adjustment for tilting the fan to any angle; the fan is easily fastened to the ceiling or any other part of the tonneau; with a few feet of connecting cord and a control switch placed at a convenient point in the line it is easily attached to the storage battery of the car; the current consumption while running is 1.5 amperes; as the storage battery is charged from the generator the cost to maintain it is very small; shipping weight is 4.5 lbs., and the net weight 3.5 lbs.

Locomotive to Handle Carload and Package Freight.

The Monongahela Valley Traction Co. has recently purchased and placed in service a new 50-ton Class B Baldwin-Westinghouse locomotive, which is a duplicate of locomotive No. 2000, installed about 2 yrs. ago. The locomotive

is equipped with four type 562-D-5, 100-hp., 600-volt, field control motors and double end HL control. It will be used for general utility haulage, as this company does extensive business on a steam-railroad basis of operation. An important part of the business is the movement of gasoline tank cars from Jackson's mill on the Clarksburg-Weston lines to the freight interchange of the B. & O. railroad near Clarksburg.

The general characteristics of this locomotive are as follows: Weight, 50 tons; maximum tractive effort (25% adhesion), 25,000 lbs.; normal tractive effort at 9.7 mi. per hr. (full field 1 hr.), 15,200 lbs.; continuous tractive effort with forced ventilation (short field), 9000 lbs.; maximum trailing load starting on 0.5% grade, 860 tons; balancing speed (short field at 600 volts) on level with 500-ton trailing load, 17.5 mi. per hr., and balancing speed (short field at 600 volts) on 3% grade with 200-ton trailing load, 10.5 mi. per hr.

The locomotive will also be used in conjunction with locomotive No. 2000 in hauling coal to the Domestic Coke Co. plant at South Fairmont, as well as for hauling carloads of slag for ballast work along the railway company's tracks. Freight business on this property has increased considerably, both in carload and less-than-carload movement, the latter being handled on a package freight basis.

Electrical Device for Barbers and Beauty Parlors.

A device, known as the "Electric Maid," has recently been placed on the market by E. P. Clark, proprietor of the Electric Specialty Manufacturing Co., 133 West Washington street, Chicago. The manufacturer states that this device is adjustable to any position. It is designed for use in barber shops, by manicurists, beauty parlors, etc. The machine is equipped with buffer, nail cutter, cleaner and polisher, all in one piece, and so arranged that it pushes back the cuticle. The device can be connected to any light socket and a universal motor will operate it easily.

The illustration shows the machine utilized as a hair drier. The deodorizing pan is adjustable under a fan. It can also be used for perfuming a room or for vaporizing purposes by the use of water, the rapid condensing of the water cooling and moistening the room. A wire guard can be used instead of the band as shown in the illustration by removing the fan and putting in the shaft for cutting, polishing and cleaning nails. Attached to the machine is an auxiliary cleaner to remove particles of heavy dirt under the nail.

The "Electric Maid" Utilized as a Hair Drier.

Registration of Trademarks Under United States Law.

Proper names, surnames, geographical terms, descriptive words and names of companies which have been used for at least 1 yr. as trademarks in interstate or foreign commerce may now be registered at the U. S. Patent Office to enable registrants to secure protection for such marks in foreign countries, which marks they could not heretofore register in the United States, and could not register at all in foreign countries where a certified copy of the United States registration was required. Fanciful names or designs may be registered, no matter how short a time they may have been used as trademarks.

The countries connected with the Pan-American Convention are the United States, Cuba, Mexico, Panama, Nicaragua, Honduras, Haiti, Guatemala and Costa Rica, constituting the northern group. The southern group comprises Argentina, Bolivia, Brazil, Chile, Paraguay, Uruguay, Colombia, Ecuador, Peru and Venezuela. Registration under this convention now saves hundreds of dollars. A few of the countries have not ratified. It is stated that this act opens the door for the registration of thousands of marks not heretofore registerable.

Electric Ice Cream Freezer for Household Use.

A new electric ice cream freezer for household use is being manufactured

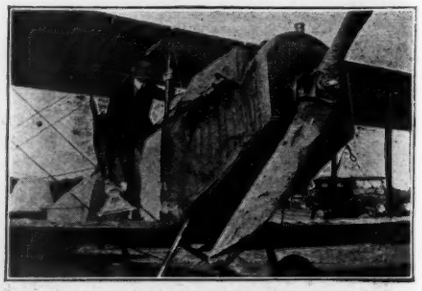
Edmands Electric Freezer.

by Walter S. Edmands, 25 Pearl street, Boston. The motor is direct connected and located in a separate compartment above the freezer and therefore protected from water and dampness. The bottom of the compartment forms the top of the freezer case to which it is secured by hinges. Opening the cover disengages the drive from the freezer at the same time cutting off the current. There are, therefore, no parts in motion when the case is open. Closing the cover puts the motor and freezer into instant operation automatically.

The freezer is secured in place by special castings in case, which require no clamps or adjusting screws and is consequently readily removed from or replaced in position. The machine is shipped ready to use with 10 ft. of cable cord and separable attachment plug.

Airplane Utilized to Deliver "Apex" Cleaner.

F. M. Berry, who sells the "Apex" electric suction cleaner down in Bir-



Delivering "Apex" Cleaner by Airplane.

mingham, Ala., appears to be a regular "high flier." The cameraman caught him the other day in the act of delivering an "Apex" cleaner by airplane, which shows that high-speed methods and Berry are very good friends. "The Apex cleans by air and is delivered by air," declared Berry.

ACTIVITIES IN THE TRADE

Business Developments, Sales Agencies, Trade Literature and Miscellaneous Items Concerning Electrical Manufacturers and Allied Business Interests

Kentucky Electric Lamp Co., Owensboro, Ky., has filed notice of increase in its capital stock from $100,000 to $200,000.

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has issued a price list of Westinghouse appliances and ranges, effective May 10.

Reliance Electric & Engineering Co., Cleveland, has moved its Chicago office to room 2013 Fisher building, where Edward F. J. Lindberg is in charge.

Holophane Glass Co., 340 Madison avenue, New York City, has issued new discount sheets, effective May 1, covering "Holophane" reflectors and fittings.

English Electric Co. plans to extend its operations to Canada and will establish factories at Toronto, Ont., for the manufacture of electrical machinery and equipment.

Arrow Electric Co., Hartford, Conn., has announced that its New York sales office has been moved from 253 Broadway to 350 Madison avenue, suite 1305 Borden building.

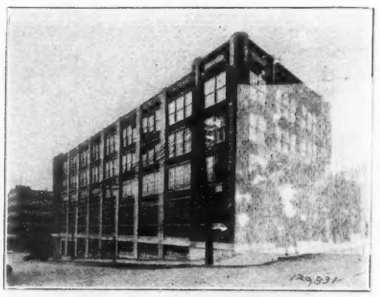
Sunny Line Appliances, Inc., Detroit, manufacturer of the "Sunny-suds" electric washer and wringer, has established a Chicago office in rooms 1106-7, Monadnock building. B. H. Turgeon is in charge as district manager.

Berkshire Electrical Co., Pittsfield, Mass., has acquired the electrical equipment and contracting business of A. W. Nicoll, Great Barrington, Mass., and will continue operations in this latter section. Mr. Nicoll will act as local manager for the company.

Duparquet, Huot & Moneuse Co., 108 West 22nd street, New York City, has issued a catalog which illustrates and describes the "Duparquet" line of electric cooking appliances for hotels, restaurants, clubs, institutions, steamships, yachts, private families, etc.

Ilg Electric Ventilating Co., 2850 North Crawford avenue, Chicago, manufacturer of self-cooled motor propellor fans, blowers, exhausters, automatic shutters, air-conditioning apparatus, etc., has announced that it has mailed to electrical contractors and dealers, also a number of central stations selling appliances, a broadside letter and window poster covering the "Ilg" electric ventilating equipment. Mention is also made of the company's new sales plan book entitled "Cash Sales With Two Profits," in which the dealer's attention is called to a new way of getting business from various fields and classes of users who do not already own ventilating apparatus.

Westinghouse Electric & Manufacturing Co. recently moved all divisions of its Cincinnati branch into one big building located at Third and Elm streets, and known as the Westinghouse building. The building, which is strictly modern, concrete and fireproof throughout, is now only five stories high but has a substructure suitable for eight, in order to allow for expansion. The offices and warerooms of the Westinghouse Lamp Co. and the offices and shops of the service department are in this building. This combination of all Westinghouse



Westinghouse Company's New Building at Cincinnati.

activities under one roof eliminates the delays and worries incident to the old method of having offices downtown, with the warehouse and service department in a remote district. Situations which formerly required telephone conversations, long cross-town "hikes," correspondence and delay, are now handled personally via the elevator. The large warerooms, each having an area of 12,500 sq. ft., are equipped with traveling cranes for handling heavy material. The service department, with a busy working force of 45 people, occupies an entire floor and is equipped to service anything from a curling iron to a huge 4500-kw turbine. A private railroad switch-track has been built to the rear of the building where cars are loaded and unloaded. A large concrete loading platform further facilitates the receiving and shipping of freight.

Senga Chemical Co., 359 Pine street, Providence, R. I., has issued a folder setting forth the advantages of using "Senga" soldering products. It is stated that the paste remains in good condition in hot or cold weather; is a labor-saving flux and makes a satisfactory electrical bond and a clean joint. The "Senga" soldering salts are manufactured especially for tin, brass and copper workers.

Newark Electrical Supply Co., 223 Market street, Newark, N. J., has published the first number of a news sheet entitled "Nelectra-Grams," devoted strictly to the presentation in "epigrammic" brevity of the trade news and gossip of the electrical interests in New Jersey. In this initial issue comment is made upon the apparent trade revival and existing labor troubles and the outlook for a wonderful "Hotpoint" week—May 16-21—for the contractor-dealer. Note is also taken of the return of Charles R. Newman, C. R. Newman & Sons, Inc., Passaic, N. J., and former president of the New Jersey Contractor-Dealers' Association, from a 4 mo. sojourn in Florida. The developments of the illuminating campaign now being conducted by the company and the future demonstrations and meetings planned are given.

Chase-Shawmut Co., Newburyport, Mass., has issued bulletin No. 201, describing the full line of material manufactured by the company, which includes renewable and inclosed fuses, porcelain cutout bases, slate cutout bases, clips, contacts, lugs, automobile fuses, fuse wire, fuse links, ground clamps, etc.

Standard Electric Stove Co., Toledo, O., has issued a booklet entitled "Cook Everything Easier, Cleaner, Better by Electricity." It is known as the "Standard" advertising copy book and contains samples of electric-range advertisements and pointers to dealers who handle the "Standard" electric-cooking outfits.

Peerless Light Co., 663 West Washington boulevard, Chicago, has issued its fixtures part catalog No. D-15, which is one of the 14 sections of the company's general catalog. Each division bears its own tab and when the catalog is compiled it will form one of the most complete electrical catalogs ever issued by the company.

Western Electric Co., 110 William street, New York City, has announced that the good-will advertising sent out by it in 1920 is being continued, and in connection with this campaign the company has issued the third series of ads. as they are now appearing in the magazines. This national campaign, which is now in full swing, has for its object the encouragement of institutional advertising by the public utilities and their friends.

M. S. Wright Co., Worcester, Mass., manufacturers of vacuum cleaners, write as follows under date of May 14: "Our attention has been called to an item on page 677 of your April 23 issue, which states that the Electric Outlet Co. has secured an interest in the M. S. Wright Co. for the manufacture of vacuum cleaners and player-pianos. All the statements in this item are absolutely false and without foundation, and we would ask you in your next issue to print a correction. The Electric Outlet Co. has not secured an interest in the M. S. Wright Co., nor is the M. S. Wright Co. doing any work at the present time for the Electric Outlet Co. At no time has there been any discussion or negotiation on the part of either the Electric Outlet Co. or ourselves, bearing on the possibility of the Electric Outlet Co. purchasing an interest in the M. S. Wright Co."

PERSONAL MENTION

Biographical Sketches and Chronicle of Changes in Business Connections, Promotions and Other Personal News of the Industry

RICHARD GREGORY, comptroller of the Western Electric Co., 195 Broadway, New York City, has been made a member of the board of directors.

HARRY B. JOYCE has resigned as a member of the firm of Johnson & Benham, Inc., consulting engineers, to assume charge of the engineering work of the Centrifugal Fan Co., Newark, N. J.

S. WALLACE MURKLAND, who has been assistant comptroller of the Western Electric Co., 195 Broadway, New York City, since 1918, has been appointed general contract sales manager.

CLARENCE M. DAVISON, formerly manager of the service station, Alsop Motor Corp., Richmond, Va., has been appointed superintendent of the Poole Engineering & Machine Co., Baltimore.

SAMUEL INSULL, president of the Commonwealth Edison Co., Chicago, was chosen president of the Commercial Club of Chicago at the recent election of that organization, to succeed Howard Elting.

W. H. HARRINGTON, formerly assistant chief engineer of the New Departure Manufacturing Co., Bristol, Conn., has been appointed electrical engineer of the Arrow Electric Co., Hartford, Conn.

DR. RALPH S. LILLIE, formerly professor of biology at Clark University, Worcester, Mass., has been engaged by the General Electric Co. to organize a biological research laboratory in Cleveland.

H. B. KENNEY, formerly of Harris, Forbes & Co., and HOWELL EVANS, formerly of the Guaranty Co. of New York City, have become associated with the bond department of J. G. White & Co., Inc., New York City.

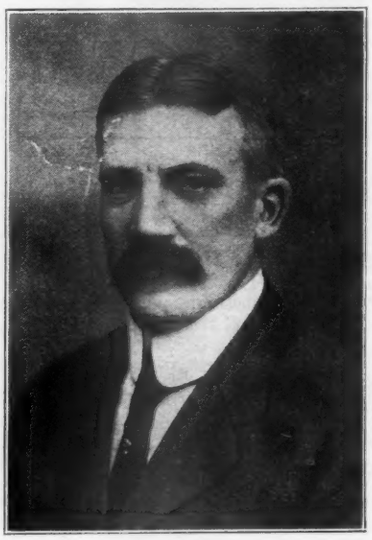
GEORGE S. DAVIS, in charge of the radio service of the United Fruit Co., has been elected a director of the Radio Corp. of America, 233 Broadway, New York City. Mr. Davis is also president of the Wireless Specialty Apparatus Co., Boston.

GEORGE A. DIEBERT, chief safety director of the Georgia Railway & Power Co., Atlanta, Ga., has been appointed chairman of the committee of the Atlanta Advertising Club, which is to consider plans for the organization of a safety council in Atlanta.

WALTER A. SHAW, formerly a member of the Illinois Public Utilities Commission, has opened an office as consulting engineer at 30 North LaSalle street, Chicago, where he plans to devote his time to municipal engineering and construction work and to cases coming under the jurisdiction of the Illinois public utilities act.

B. H. CLINGERMAN, who has been a member of the engineering staff of the B. F. Goodrich Co., Akron, O., for a number of years, has recently been appointed consulting engineer for the company. He was formerly associated with H. M. Byllesby & Co., and was general manager of the Mountain States Power Co. at Tacoma, Wash.

FREDERICK HAYES WILKINS, European general manager of the International Western Electric Co., with headquarters in London, has been elected a vice-president of the company. He was born in Sennett, N. Y., April 5,



F. H. Wilkins.

1861, and was educated at the University of Rochester, where he graduated in 1882 with the degree of Bachelor of Arts. In August, 1882, Mr. Wilkins entered the clerical department of the Western Electric Co. at New York City, eventually becoming manager of that branch. He went to Europe in 1910 to look over foreign trade conditions and a year later was made European general manager of his company. Mr. Wilkins is a member of the American Club, the Institution of Electrical Engineers and the Zoological Society of London, and the Cercle Philotaxe of Antwerp.

C. O. MORTON, for the past 3 yrs. with the Westinghouse Electric & Manufacturing Co., in charge of advertising on electrical heating appliances and ranges, has joined the Cleveland branch of the Brotherton-Knoble Co., 2036 East 22d street. Throughout the 12 yrs. Mr. Morton has been in advertising work he has devoted much of his time to merchandising and dealer problems, particularly in the electrical field.

JAMES R. BIBBINS, has resigned as supervising engineer of the Arnold Co., Chicago, to accept an appointment as manager of the department of transportation and communication of the Chamber of Commerce of the United States, Washington, D. C. This new department will have a wide range of activities, covering shipping, ocean and inland, steam and electric railroad transportation, air transportation, cables and telegraphs, postal facilities and highways. Mr. Bibbins is a fellow of the American Institute of Electrical Engineers and has been serving as chairman of the Chicago Section.

W. I. SAVIDGE, who was formerly connected with the Live Wire Supply Co., has opened an office in room 5, Gamage building, Macomb, Ill., where he will conduct an electrical contracting business and handle a line of special appliances.

R. W. VAN PELT has been appointed sales representative for the St. Louis territory for the Maring Wire Co., Muskegon, Mich., manufacturers of enameled, cotton and silk-covered magnet wire. He will make his headquarters at 926 Century building, St. Louis.

C. W. KOINER, who for 13 yrs. has been general manager and mechanical and electrical engineer of Pasadena's municipal light and power department, was appointed city manager of Pasadena, Cal., May 2. The new position will give him the administration of all municipal affairs other than the library and legal departments.

MAX HERSKOVITZ, president of the Peerless Light Co., 663 West Washington boulevard, Chicago, recently returned from a 2-mo. pleasure trip on the Pacific Coast. In commenting on his visit he said: "The people on the Coast are certainly away in advance from an electrical point of view than they are in the Middle West and the East. I look for big things from that part of the country in the next few years."

JOHN J. SWAN has become associated with the Engineering Business Exchange, 30 Church street, New York City, and has removed there from Indianapolis, resigning his position with the Prest-O-Lite Co., which he has held for 2 yrs. He graduated from Cornell in 1897 and later held engineering and executive positions with the Ingersoll-Rand Co., Longmead Iron Co., Chicago Pneumatic Tool Co., Keller Manufacturing Co., and the American Arms Corp.

OBITUARY.

F. W. GARTMAN, vice-president aud general foreman of the York (Pa.) Electric Machine Co., died May 3, aged 38 yrs.

EDWARD J. DIEFENDORF, production engineer at the Erie (Pa.) plant of the General Electric Co., died last month at the age of 39 yrs. He graduated from the engineering school of the University of Pennsylvania and became a member of the engineering corps which under William G. McAdoo built the Hudson river tunnels. Upon completion of that work he returned to Erie to become general manager of the Erie Stamping Co. Mr. Diefendorf had been in the production engineering department of the General Electric Co. for several years.

BUSINESS OPPORTUNITIES

News of Electrical Construction Projects in All Parts of the Country, Proposals Invited, Foreign Trade Openings and New Companies

EASTERN STATES.

Winthrop, Me.—C. M. Bailey & Co. will make extensions and improvements in the power plant at their oilcloth factory, including new equipment installation, in connection with the rebuilding of the manufacturing plant, recently destroyed by fire with a loss of about $150,000.

Woodland, Me.—The Colby Light & Power Co. has been incorporated with a capital of $10,000 to operate a local plant and system. Frank A. Anderson is president and C. Albion Johnson, treasurer.

Danvers, Mass.—The Department of Mental Diseases, Commonwealth of Massachusetts, has broken ground for the erection of its proposed electric power plant at the Danvers State Hospital. The R. D. Kimball Co., 6 Beacon street, Boston, is engineer.

Northampton, Mass.—The Northampton Electric Lighting Co., Main street, has awarded a contract to the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., for electrical equipment for installation at its proposed substation, including switchboard and other apparatus.

Springfield, Mass.—Electrical equipment will be installed in the proposed addition to the plant of the Smith-Springneld Body Co., manufacturer of automobile bodies.

New Haven, Conn.—Bonds have been voted for improvements to the municipal electric light and water system, including power house, 38-hp. semi-Diesel fuel oil engine, 25-kv-a. 3-phase alternating current generator, etc. Address city clerk.

Providence, R. I.—The Narragansett Electric Lighting Co. has arranged for an increase in its capital stock from $15,000,000 to $20,000,000.

Brooklyn, N. Y.—Electric equipment will be installed in the 3-story addition to be constructed at the plant of the Burley Welding Works, 22-24 Kosciusko street, estimated to cost $50,000.

Cape Vincent, N. Y.—The E. W. Coon Co. is planning the rebuilding of its cold-storage plant, recently destroyed by fire, with loss estimated at $400,000. Electric equipment, mechanical apparatus and refrigerating machinery will be installed.

Long Island City, N. Y.—Electrical and mechanical equipment will be installed in the automobile assembling plant to be established by the Durant Motor Co., 1764 Broadway, New York city, in the 8-story building at Jackson avenue and Honeywell street. The structure will be remodeled to accommodate the new works at a cost of about $200,000.

Lyons Falls, N. Y.—The Moose River Power Co. has been incorporated with a capital of $10,000, to operate a local electric plant and system. The incorporators are F. DeP. Hone, C. W. Tillinghast and C. L. J. Ager. Porter & Taylor, 30 Broad street, New York city, represent the company.

New York, N. Y.—The New York Edison Co., 130 East 15th street, is taking bids for the superstructure of its proposed substation on Greene street, to be 3-story, 50 by 100 ft., and estimated to cost $160,000 with machinery.

Utica, N. Y.—The Madison Power Co. has been incorporated with a capital of $200,000, to operate in Madison and Oneida counties. The incorporators are E. F. Joerissen, A. J. Eckert and F. C. Thurwood. The company is represented by Dunmore, Farris & Dewey, Utica.

Laurel Spring, N. J.—The H-K Electric Co., Inc., has been incorporated with a capital of $25,000 to operate an electric plant and system in this section. The incorporators are A. W. Houchin, Jr. and Sr., Laurel Spring, and George Kuensth, Philadelphia.

Newark, N. J.—Electrical equipment will be installed in the proposed industrial building to be erected by the Board of Freeholders at Overbrook Hospital. It will be 60 by 170 ft., and is estimated to cost about $125,000. Frederick S. Sutton, 9 Clinton street, is architect.

Catasauqua, Pa.—The Pennsylvania Power & Light Co. will replace its pole lines, transformers and other equipment in this section, making an entirely new installation for increased efficiency. The work is expected to require several months to complete.

Coatesville, Pa.—The Town Council has approved an ordinance providing for the installation of a "white way" lighting system on the Lincoln Highway, to be formed of clusters mounted on poles. About 100 lamps will comprise the initial installation.

Erie, Pa.—Considerable electrical equipment will be installed at the proposed new automobile motor plant of the Master Motors Corp., estimated to cost $500,000 with machinery. D. H. Palmer is president.

Lock Haven, Pa.—The Pine Creek Electric Light Co. has been incorporated with a nominal capital of $5000 to install and operate an electric light and power system in this section. W. S. Harris is treasurer.

Newtown Square, Pa.—An appropriation of $300,000 has been arranged by the Board of Directors of the Dunwoody Home for Convalescents for the erection of its proposed institution, to include a complete power house for general operating service. Clarence W. Brazer, Crozer building, Chester, Pa., is architect.

Oil City, Pa.—The city engineering department will install electrical equipment in connection with the construction of a garbage disposal plant, estimated to cost $40,000. B. B. Weber is city engineer.

Pottsville, Pa.—The Eastern Pennsylvania Light, Heat & Power Co., of Potter Township, has been incorporated with a nominal capital of $5000 to install and operate an electric light and power system in this section. L. A. Reinhart, Schuylkill Haven, Pa., is treasurer.

Reading, Pa.—Considerable electrical equipment will be installed in the addition to be constructed at the plant of the Oakbrook Hosiery Co., estimated to cost $150,000.

Sharpsburg, Pa.—The Common Council has arranged a bond issue of $130,000 for municipal improvements; a considerable portion of the fund will be used for extensions and betterments in the local light and power system.

Baltimore, Md.—Electrical equipment will be installed in the 2-story automobile service building on Biddle street, to be erected by the Acme Garage & Auto Co., 912 Lovegrove alley, at a cost estimated at $150,000. O. E. Adams, Calvert building, is architect.

Baltimore, Md.—The City Council has awarded a contract to Riggs, Distler & Stranger, 216 North Clavert street, for the construction of a steam power house for the city on Gay street.

Baltimore, Md.—The Consolidated Gas, Electric Light & Power Co. has taken title to the power plant of the United Railways & Electric Co., on Pratt street. A consideration of about $4,000,000 was given for the property.

Thurmont, Md.—The Common Council has approved plans for the construction of a substation, to be used as an auxiliary to the present electric lighting plant.

Pulaski, Va.—The Virginia Anthracite Coal Corp. is planning the installation of electrical and other machinery at its properties. The company has recently increased its capital stock from $1,500,000 to $5,000,000. John G. Hayes is construction engineer.

Charleston, W. Va.—Electrical equipment and refrigerating machinery will be installed in the 3-story cold storage plant, to be erected here by A. L. Robinson, Winchester, W. Va. Plans have been prepared by Architect Quingley Hafer, 155 Garfield street, Chambersburg, Pa.

Blowing Rock, N. C.—W. L. Alexander is planning the erection of an electric power plant in connection with his development of property at Mayview Park, with installation of a local distributing system.

Landrum, S. C.—The Common Council is planning the installation of

an electric light and power system. Power will be purchased from the Blue Ridge Power Co., and cut down for local distribution.

Laurens, S. C.—The Common Council is arranging a bond issue of $125,000 for municipal improvements, a large part to be expended for extensions in the electric light and power system.

Augusta, Ga.—The City Council is arranging for the organization of a municipal power company, to be known as the City of Augusta Power Corp. A bond issue will be voted for $5,000,000 to cover the cost of a hydroelectric generating plant and the electrification of the local canal. Lockwood, Greene & Co., Atlanta, Ga., and 101 Broadway, New York City, are engineers for the project.

Cordele, Ga.—The City Council has approved a bond issue of $40,000 for the erection of a municipal electric light and power plant. W. G. Webb is engineer.

Fort Lauderdale, Fla.—The Southern Utilities Co. is planning extensions in its local lighting system to Las Olas Beach and Idlewyld.

Jacksonville, Fla. — Considerable electrical equipment will be installed by the City Dock Commission in connection with improvements to the municipal docks, bonds for which in an amount of $1,000,000 recently were voted. The work will include new coal-loading machinery, electric hoisting and other equipment.

St. Petersburg, Fla.—The Common Council is planning the installation of an electrically operated pumping plant in connection with the city waterworks.

NORTH CENTRAL STATES.

Battle Creek, Mich.—The four-armed variety of ornamental light standard used in the business district will be remodeled, a tall, pear-shaped globe at the top taking the place of the five now in use. Address Charles C. Green, mayor.

Berrien Springs, Mich.—The council has been requested to authorize the installation of the curb-lighting system extending for two blocks from Mechanic to Cass streets. Address Otto Franks, local manager of the Indiana & Michigan Electric Co.

Kalamazoo, Mich.—The City Commission may extend its street-lighting program for 1921. More lights will be installed. Address Harry Freeman, city manager.

Marlette, Mich.—Clarence W. Hubbell, engineer, 2348 Penobscot building, Detroit, has prepared plans for the erection of an electric light and water works plant. Address village clerk.

St. Joseph, Mich.—Bids were received May 17 for all necessary materials for a complete curb-lighting system. Address Harry Harper, city clerk.

Traverse City, Mich.—Burd & Griffels, engineers, Grand Rapids, have prepared plans for a new power plant on the Boardman river to cost $250,000.

Shelbyville, Ind.—Harry W. Deprez has applied to the Federal Power Commission for a power development project at the U. S. Government Dam No. 5, on the Muskingum river, at Lake Chute, for public utility purposes.

Chicago, Ill.—A plan for consolidating and improving the fire and police department signal systems at a cost of from $3,000,000 to $5,000,000 was submitted May 12 to the city council gas and electric light committee by William G. Keith, commissioner of gas and electricity.

Flora, Ill.—An election will be held to vote on the question of issuing $295,000 electric light improvement bonds. Address the mayor.

Galesburg, Ill.—The city engineer is preparing plans for establishing a fire-alarm system. Address city clerk.

Rockford, Ill.—The Rockford Electric Co. will expend $241,000 on improvements to its plant. It is planned to build a switchtrack and coalyard and an outdoor switchboard. Address Adam Gschwindt, general manager.

LaCrosse, Wis.—Directors of the LaCrosse Interurban Telephone Co. have made an appropriation of $6000 to complete the long-distance toll line from Lynxville to Prairie du Chien as soon as the material can be delivered there. The line will require about 5000 lbs. of copper wire and 3 cars of cedar poles.

Griswold, Ia.—The Prince-Nixon Engineering Co., Omaha, Neb., has prepared estimates on the cost of installing a municipal plant, the estimated cost being $48,142.

Iowa Falls, Ia.—The city is planning to erect a municipal electric light plant at a cost of $150,000. Address city clerk.

Clarksville, Mo.—The Clarksville Light & Power Co. has been organized with a capital of $20,000, to construct a transmission line to Louisiana, Mo. Address the manager.

Columbia, Mo.—The board of directors of the University of Missouri is planning the erection of a steam-operated powerhouse and heating plant at the institution. James P. Jamieson, Security building, St. Louis, is architect.

Fulton, Mo.—The board of directors of the Fulton State Hospital is planning the construction of a powerhouse at the institution. M. O. Biggs is superintendent.

Marysville, Mo.—The Marysville Electric Light Co. is planning the installation of new equipment at its plant to cost about $30,000, for increased capacity.

New Haven, Mo.—Bids were received May 20 for constructing a powerhouse building, including machinery foundations, a 30hp. special electric type semi-Diesel fuel-oil engine, and a 25-kv-a. 3-phase, 60-cycle, 2300-volt, belt-driven generator with exciter and switchboard panel, etc. Address John Greenstreet, city clerk.

Springfield, Mo.—Electrical equipment will be installed in the new plant of the Interstate Milling Co. The company was recently incorporated with a capital of $250,000. A. C. Daly is president and treasurer.

Unionville, Mo.—The City Council has arranged for a bond issue of $84,000 for the construction of a municipal electric light and power plant, in connection with a waterworks system.

Great Bend, Kan.—The Great Bend Water & Electric Co. is making preparations to add some new equipment to its plant to increase the capacity. Manager E. A. Wright stated that a new 500-hp. Diesel engine had been purchased and that other improvements were under way.

Osborne, Kan.—The city plans to install an additional power unit of nearly 350 hp. for the electric light plant. The unit will consist in general of a Diesel type oil engine, direct connected to an a-c. generator. Address C. M. Smith, mayor.

Hershey, Neb.—Additional light and water bonds to the amount of $10,000 were voted. Address city clerk.

SOUTH CENTRAL STATES.

Paducah, Ky.—The City Council has awarded a contract to the Paducah Electric Co. for the installation of a new lighting system in the business section.

Memphis, Tenn.—Electrical equipment will be installed by the City Engineering Department in connection with proposed extensions of river terminals, estimated to cost $950,000. W. B. Fowler is city engineer.

Morristown, Tenn.—The Borough Council is planning a bond issue of $15,000 for extensions in the local electric lighting system.

Ragland, Ala.—The city will extend its electric lighting system and will also improve present plant. Address the mayor.

New Orleans, La.—The Consumers' Electric Light & Power Co. will establish several plants. Address W. J. Aicklen, president.

Cherokee, Okla.—The Common Council has arranged for a bond issue of $60,000 for extensions in the municipal electric power plant.

Schulter, Okla.—The B. & A. Mining Co., Okmulgee, Okla., is planning the installation of new electrically operated mining machinery at its properties at Schulter.

Weleetka, Okla.—The City Council is having plans prepared for the erection of an addition to its electric lighting plant. V. V. Long & Co., 1300 Colcord building, Oklahoma City, Okla., are engineers.

Edinburg, Tex.—An election will be held to vote on the question of issuing $30,000 electric light bonds. Address A. J. Ross, mayor.

WESTERN STATES.

Boise, Ida.—The Grandview Light & Power Co., recently organized, will operate a light and power system in the vicinity of Grandview.

Boise, Ida.—The City Council is developing plans for the erection of its proposed hydroelectric generating plant on the north and south forks of the Payette river, estimated to cost $1,500,000. S. W. Atkinson is assistant city engineer.

Walla Walla, Wash.—The Blue

Mountain Light & Power Co. has made application for permission to use waters on the Walla Walla river for a new hydroelectric power plant. The station is estimated to cost $300,000. K. G. Harlan is head of the company.

Portland, Ore.—The Portland Railway Light & Power Co.'s estimated 1921 expenditures already provided for reach $1,643,000 and several projects that may be included bring the tentative total up to nearly $2,000,000.

Banning, Cal.—The Southern Sierras Power Co. is perfecting plans for the erection of its proposed hydroelectric power plant at Banning. Roads are being built to transport building materials and machinery to the site. Headquarters of the company are at San Bernardino, Cal.

Fullerton, Cal.—The Board of City Trustees is planning the installation of a new ornamental street-lighting system on Spadra street and other thoroughfares in the business district.

Groveland, Cal.—The Yosemite Power Co. has applied to the Federal Power Commission for a preliminary permit to construct two reservoirs, a conduit and power house in the south fork of Tuolumne river; a diversion dam on the main stream, just below the mouth of the south fork, and a 17-mi. conduit to a second power house at Wards Ferry.

Lodi, Cal.—The Board of City Trustees is planning the installation of an underground conduit system and electroliers in a number of streets. L. F. Barzellotti is city engineer.

Los Angeles, Cal.—The Little Rock Power & Water Co. has made application to the State Water Commission for permission to utilize water from Little Rock creek, Los Angeles county, for the erection of a hydroelectric power plant, estimated to cost $680,000.

Los Angeles, Cal.—The Department of Public Service, 603 Knickerbocker building, has applied to the Federal Power Commission for a preliminary permit to construct two power installations in San Francisco canyon, in connection with the Los Angeles Owens river aqueduct in Los Angeles county, Cal. The city is also applying for a license for the upper one of these plants. The project is for public utility purposes.

Los Gatos, Cal.—The Board of City Trustees is planning the installation of a complete new street-lighting system.

San Bernardino, Cal.—The City Engineering Department is considering the construction of a new hydroelectric power plant for municipal use. Application has been made for water rights to permit a plant of about 5000 hp. capacity. The new station, with 20 mi. of distributing system, is estimated to cost $3,000,000. W. P. Rowe is engineer for the project.

San Diego, Cal.—The San Diego Consolidated Gas & Electric Co. is planning extensions and improvements in its system to cost about $520,000. A substation will be erected, and a number of additions made in the distributing system. Negotiations are being completed for the purchase of the local power plant of the San Diego Electric Railway Co., with present capacity of about 14,000 hp.

Woodland, Cal.—The Board of City Trustees has awarded a contract to the Municipal Improvement Co., 357 12th street, Oakland, Cal., for the installation of new electrolier lighting system on Main street, to cost about $21,000. A total of 78 new standards will be installed.

Madera, State of Chihuahua, Mexico.—An electric power plant is being constructed near here by the Dolores Mining Co. at a cost of $300,000. The plant will generate 2000 hp., and the ore-reduction electrical energy, in addition to being used to operate the machinery and mill of the company, will be transmitted to outlying mining camps and industrial centers for a distance of 40 mi.

CANADA.

Walkerville, Ont.—The Utilities Board is planning for extensions in its hydroelectric generating plant to cost about $100,000.

PROPOSALS.

Washington, D. C.—A. L. Flint, the general purchasing officer of the Panama Canal, will receive bids up to 10:30 a. m., May 25, for a quantity of copper cable, magnet wire, dry batteries, dynamometers, fuses, commutator resurfacers, cable grips and other material, all as set forth in Circular 1448.

Dawson Springs, Ky.—Bids will be received May 25 for the installation complete of the mechanical equipment for the power house at the United States Public Health Service Sanitarium. Address James A. Wetmore, supervising architect, Washington, D. C.

Watertown, S. D.—Bids will be received May 23 for power plant equipment. Address A. J. Mueller, superintendent.

INCORPORATIONS

Boston, Mass.—New England Signal Reflector Co. Capital, 500 shares of stock, no par value. To manufacture electric signaling equipment. Dudley M. Holman is president, and William H. MacDowell, 47 Liberty street, East Braintree, Mass., is treasurer.

Worcester, Mass.—The Ritchie Co. Capital, $50,000. To manufacture and deal in storage batteries. Incorporators: William A. Ritchie, Sr. and Jr., and Harry A. Wheeler.

New York, N. Y.—Roter Engine Corp. Capital, $750,000. To manufacture steam and gas engines. Incorporators: C. L. Thompson, E. S. Hayne and E. S. Hamilton. L. B. Koch, 25 West 43d street, is representative.

Brooklyn, N. Y.—Lake-Erbe Manufacturing Co. Capital, $5000. To manufacture electrical equipment. Incorporators: G. G. Erbe, A. O. and J. Lake, Jr., 1826 14th street, Brooklyn.

Newark, N. J.—Alp Electric Manufacturing Co., 325-27 East Ferry street. To manufacture electrical equipment. Incorporators: Mauritz Larsen and John Anenson, Arlington, N. J.; and Wilfred A. Peterson, Belleville, N. J.

Union, N. J.—Independent Contact Manufacturing Co. Capital, $100,000. To manufacture electrical equipment. Incorporators: Clemens A. Laise, Albert J. King, Weehawken, N. J.

Newark, N. J.—Dependable Electric Co., 97 Wright street, has filed notice of organization to engage in electrical contracting. James R. Ackerman and Harry E. Powers head the company.

West Orange, N. J.—Superior Incandescent Lamp Co., 593 Ogden street, has filed notice of organization to manufacture electric lamps. Philip H. Harrison, 27 Babcock place, heads the company.

Newark, N. J.—Modern Electrical Supply Co. Capital, $50,000. To manufacture electrical products. Incorporators: William Locke and Max Schoether.

Philadelphia, Pa.—MacLaren Electric Appliance Corp. Capital, $2,500,000. To manufacture electrical appliances and equipment. Incorporators: F. R. Hansell, J. Vernon Pimm and E. M. MacFarland.

Bridgeport, Conn.—Automotive Electric Service Co. Capital, $50,000. To manufacture and deal in electric equipment for automobile use. Incorporators: W. T. Walkley, R. J. Larrabee and J. V. Stanaland, 676 Fairfield avenue.

FOREIGN TRADE.

[Addresses of firms referred to in these trade opportunities may be obtained by writing to the Bureau of Foreign and Domestic Commerce, Washington, D. C., or its branch and local co-operative offices. Request for each opportunity should be on a separate sheet and the file number given.]

Electrical Apparatus (34,763)—A manufacturer in Switzerland desires to purchase or secure an agency for the exploitation in Switzerland or the European Continent of an article of the electrotechnical branch. Reference.

Copper-Wire Bars (34,796)—A mercantile firm in Spain desires to purchase and secure an agency from manufacturer only for the sale of electrical copper-wire bars with a guaranteed minimum conductibility of 98 to 99%, weighing from 60 to 70 kgs. each, for laminating. Also copper blocks for laminating, weight to be in accordance with specifications; copper and brass in all forms, tinplate, aluminum, white metal, etc. Quotations should be given c. i. f. Spanish ports. Payment to be made against documents. Correspondence should be in Spanish. References.

Telephone Equipment (34,797)—A firm in Mexico desires to purchase a complete automatic-call-telephone equipment, including receivers, transmitters, switches, 2 mi. of wire, batteries, insulators, etc., for a 6- to 10-party system. Quotations should be given f. o. b. New York City or San Francisco. References.

FINANCIAL NEWS

Comment on the Financial Outlook in the Electrical Industry, New Securities, Reports of Earnings, Dividends and Utility Stocks

Offering of Portland Railway, Light & Power Co. Bonds.

The National City Co. and Halsey, Stuart & Co., Chicago, are offering at 96 and interest, yielding over 7.85%, $4,500,000 Portland Railway, Light & Power Co. first lien and refunding mortgage gold bonds, running for 25 years and bearing 7.5% interest. The Portland Railway, Light & Power Co. supplies electric light and power in more than 20 communities in Western Oregon, including Portland. It also operates the Portland City Railway System. For the past 12 years 88% of the electric energy has been generated by water power. Continuance of economical operation will be made possible, it is stated, through development of additional hydroelectric properties. Net earnings of the company for the 12 mo. ending April 30, 1921, were more than twice the annual interest charges on all mortgage bonds outstanding with the public, including this issue.

Bond Issue Planned by Connecticut Utility.

The Connecticut Light & Power Co. has arranged for a bond issue of $6,500,000, a portion of the proceeds to be used for proposed extensions and improvements in plants and system. The company is now operating two hydroelectric generating stations with a total capacity of 34,600 hp. and steam-driven plants of about 33,000 hp. The transmission system aggregates 120 mi. Irvin W. Day is vice-president.

Philadelphia Electric Co. to Issue Bonds.

The Philadelphia Electric Co. has arranged for a preferred stock issue of $5,000,000, the proceeds to be used in part for extensions, general operations, etc. The company operates three large generating stations, with a total capacity of 276,000 kw., and smaller plants bringing up the maximum output to 320,000 kw. Joseph B. McCall is president.

Bond Offering of Milwaukee Electric Railway & Light Co.

An issue of $5,000,000 Milwaukee Electric Railway & Light Co. 20-yr. 7½% refunding and first mortgage bonds is being offered by a syndicate composed of Dillon, Read & Co., the Harris Trust and Savings bank, and Spencer, Trask & Co., Chicago, at 95, to yield more than 8%. The purpose of the issue is to consolidate the company's debt into one mortgage. Earnings for the last 10 yrs. have been well over double interest requirements.

Offering of Niagara Falls Power Co. Bonds.

A syndicate under the management of Spencer, Trask & Co., E. H. Rollins & Sons, Chicago, and Schoellkopf, Hutton & Pomeroy, Buffalo, N. Y., are offering at 88 and interest, yielding about 7%, a new lot of $6,000,000 Niagara Falls Power Co. first and consolidation mortgage 6% bonds, series A, due Nov. 1, 1950.

Kansas City Power & Light Co.

Earnings for the year ended Dec. 31, 1920:

Gross	$6,071,013
Increase	1,321,594
Net after taxes	2,141,939
Increase	1,235,631
Surplus after charges, etc.	561,529
Increase	551,900

American Power & Light Co.'s Subsidiary.

	1921.	1920.
February gross	$2,211,941	$1,630,816
Net earnings	761,067	635,086
12 mo. gross	22,820,246	16,907,007
Net earnings	7,545,023	6,457,397

Northern Ohio Electric Co. and Subsidiaries.

	1921.	1920.
February gross	$ 747,710	$ 869,220
Net after taxes	145,574	244,471
Deficit after fixed charges	7,966	*114,242
Deficit after preferred dividends	37,966	*84,242
12 mo. gross	10,824,064	9,679,003
Net after taxes	2,259,852	2,751,166
Surplus after fixed charges	564,131	1,222,539
Balance after preferred dividends	204,131	862,539

*Surplus.

Virginia Railway & Power Co.

	1921.	1920.
February gross	$ 899,840	$ 809,415
Net earnings	274,920	321,189
Total income	286,019	332,508
Surplus after charges.	82,439	93,911
2 mo. gross	1,918,659	1,692,848
Net earnings	579,245	669,989
Total income	601,862	692,481
Surplus after charges.	194,403	210,094

Note—In 1921 depreciation was included in operating expenses, while in 1920 this item was included in charges.

Southwestern Power & Light Co. Subsidiaries.

	1921.	1920.
February gross	$ 916,119	$ 682,226
Net earnings	381,076	281,289
12 mo. gross	10,005,149	6,768,340
Net earnings	3,560,739	2,622,904

Havana Electric Railway, Light & Power Co.

	1921.	1920.
February gross	$1,034,871	$ 864,439
Net after taxes	460,831	426.473
Total income	467,021	433,168
Surplus after fixed charges	238,850	188,241
2 mo. gross	2,123,947	1,747,557
Net after taxes	911,727	872,536
Total income	924,182	885,283
Surplus after fixed charges	462,205	395,620

Manila Electric Railroad & Lighting Corporation.

	1921.	1920.
February gross	$ 306,138	$ 278,243
Net after taxes	118,120	96,565
Total income	118,371	96,759
Surplus after charges.	67,465	64,765
12 mo. gross	3,489,990	2,710,349
Net after taxes	1,270,387	801,842
Total income	1,271,436	804,499
Surplus after charges.	821,422	449,076
Balance after preferred dividends	521,422	149,076

Mississippi River Power Co.

	1921.	1920.
February gross earnings	$ 215,081	$ 195,671
Net earnings	158,679	148,077
Surplus after charges.	54,084	70,417
12 mo. ended Feb. 28:		
Gross earnings	2,744,522	2,368,084
Net earnings	2,111,336	1,841,829
*Surplus after charges	946,092	660,667

*Includes adjustment on account of St. Louis contract.

Adirondack Power & Light Corp.

	1921.	1920.
March gross	$ 382,806	$ 362,333
Net after taxes	157,824	116,181
Surplus after charges	77,831	64,899
12 mo. gross	4,795,450	4,018,073
Net after taxes	1,416,473	1,322,808
Surplus after charges	601,725	730,464

Dividends.

	Term.	Rate.	Payable.
Am. Pr. & Lt., com.	Q	1%	June 1
Conn. Pr. & Lt.	Q	$1.50	June 1
Conn. Pr. & Lt., pfd.	Q	$1.50	June 1
Fed., Util., pfd.	Q	1.5%	June 1
Keokuk Elec., pfd.	Q	$1.50	May 16
Neb. Pr., pfd.	Q	1.75%	June 1
Norfolk Ry. & Lt.	SA	$0.75	June 1
Nor. Texas El., com.	Q	$2	June 1
Phila. Elec., com.		43.75c	June 15
Phila. Elec., pfd.	Q	$0.50	June 15
Phila. Elec., 3% pfd.	Q	23.88c	June 15
Roch. G. & E. Corp., pfd.		1.25%	June 1
R. G. & E. Corp., pfd. B.		1.75%	June 1

WEEKLY COMPARISON OF CLOSING-BID PRICES OF SECURITIES OF LEADING ELECTRICAL COMPANIES.

Quotations furnished by F. M. Zeller & Co., Rookery Bldg., Chicago.

Public Utilities.	Div. rate. Per cent.	Bid May 9.	Bid May 16.
Adirondack Electric Power of Glenns Falls, common	6	10	10
Adirondack Electric Power of Glenns Falls, preferred	6	72	72
American Gas & Electric of New York, common	..	102	101
American Gas & Electric of New York, preferred	6	38½	38¼
American Light & Traction of New York, common	..	82	82
American Light & Traction of New York, preferred	6	81	81
American Power & Light of New York, common	4	57	57
American Power & Light of New York, preferred	6	70	71
American Public Utilities of Grand Rapids, common	..	7	7
American Public Utilities of Grand Rapids, preferred	7	17	18
American Telephone & Telegraph of New York	..	108	107½
American Water Works & Elec. of New York, common	..	4	4
American Water Works & Elec. of New York, particip	7	7½	7½
American Water Works & Elec. of New York, 1st preferred	..	47	48
Appalachian Power, common	..	2	2½
Appalachian Power, preferred	7	28	29
Cities Service of New York, common	+extra	242	236
Cities Service of New York, preferred	6	67	66¼
Commonwealth Edison of Chicago	8	108	109
Comm. Power, Railway & Light of Jackson, common	..	10	10½
Comm. Power, Railway & Light of Jackson, preferred	6	30	30
Federal Light & Traction of New York, common	..	6	6¼
Federal Light & Traction of New York, preferred	..	41	42
Northern States Power of Chicago, common	..	47	47
Northern States Power of Chicago, preferred	ex.div.7	80	80
Pacific Gas & Electric of San Francisco, common	..	53	53
Public Service of Northern Illinois, Chicago, common	7	78	78
Public Service of Northern Illinois, Chicago, preferred	6	82	82
Standard Gas & Electric of Chicago, common	..	12	12
Standard Gas & Electric of Chicago, preferred	8	35	35
Tennessee Railway, Light & Power of Chattanooga, common	..	¾	¾
Tennessee Railway, Light & Power of Chattanooga, preferred	6	6	6
Western Power of San Francisco, common	..	26	28
Western Union Telegraph of New York	..	90	89
Industrials—			
Electric Storage Battery of Philadelphia, common	4	98	98
General Electric of Schenectady	8	138	136¼
Westinghouse Electric & Mfg. of Pittsburgh, common	7	47	48¼